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IBM reboots data dictionary

Said to focus on needs of DB2 users

By Charles Babcock

An IBM effort to develop a repository, or global dictionary, has recently been refocused in hopes of yielding a DB2 dictionary this year, according to outside observers.

A data dictionary would be good news for users of DB2, who find the existing DB2 catalog too limited in function. But the shift would also indicate that the global dictionary for IBM's MVS subsystems — such as TSO and CICS — for defining terminal networks and for controlling application development is farther off than anticipated, the observers said.

The repository project had been under way for at least three years in Poughkeepsie, N.Y., but was moved at the end of last year to the IBM development lab in Santa Teresa, Calif., where work on IMS and DB2 is performed, according to IBM customers

and knowledgeable observers.

IBM spokesmen refused to confirm or deny the move.

"IBM has scrapped its repository project in Poughkeepsie. It's in complete disarray. IBM is starting all over again in Santa Teresa," said a customer for a large IBM site in the Midwest.

"I think it's a positive step," said Edgar F. Codd,

IBM replacing parts in 3380 head-disk assemblies. **Page 6**

president of the Relational Institute in San Jose, Calif., and one of those familiar with the changes. "In Poughkeepsie, there was an old-line team that wanted to stick with old concepts. Those concepts were not suitable for dictionary support for relational systems."

The shift indicates a change in development teams and the possibility of a long delay before the repository comes to market, said the

IBM customer, who did not know whether any members of the Poughkeepsie development team are still on the project.

"When IBM originally placed the repository project in Poughkeepsie, it was more interested in what it could do for MVS than for DB2," said another observer who asked not to be identified. With production use of DB2 growing, IBM is ready to give priority to the DB2 dictionary, he said.

Although it has not been officially announced as a product, the repository has been the subject of IBM briefings to major customers. It was described as an integrator of IBM's major MVS subsystems with a dictionary for DB2 as one of several components, customers said. The repository has also been referred to by IBM officials during conferences sponsored by research firms and other public events.

Although he declined to comment on the reported changes, an IBM spokesman

See IBM page 8

'Dbase IV' will run with SQL

By Douglas Barney

TORRANCE, Calif. — Ashton-Tate, the leader in the microcomputer data base market with Dbase III Plus, is planning a two-pronged approach to data base product development, aimed at maintaining the firm's No. 1 position in the midst of increasing competition.

The first approach involves a product that is code-named Nova. This product is the next version of Dbase that is designed to run under existing versions of Microsoft Corp.'s MS-DOS and is expected to be released later this year.

The package will contain an implementation of IBM's SQL and an improved user interface using pull-down menus similar to Ashton-Tate's Framework integrated package, sources and an Ashton-Tate executive said. See "DBASE" page 6

Stumbling in DP, Wang will post loss; cuts salaries, jobs

By Clinton Wilder

LOWELL, Mass. — Wang Laboratories, Inc., showing the continued effects of its failure to crack the data processing market, last week announced its second major work force reduction in 18 months and projected an unexpectedly large, second-straight quarterly loss.

Wang will cut 1,000 positions from its worldwide work force of about 30,000, including 600 by layoff. In addition, most salaried employees must take a 6% reduction in pay through the end of Wang's fiscal year, which

runs until June 30. The actions are intended to save \$50 million in the next six months, according to President Frederick A. Wang.



Fred Wang: Moves to pare losses

Robert L. Doretti, Wang's senior vice-president of marketing communications, said the company has been hurt by deferred orders for its VS 300 minicomputer, in part because of operating system bugs that have now been corrected.

"We had selected 10 to 15 top customers that we were sure would order 300s in October, but instead, we got them in December," Doretti said. "The operating system problems were fixed late in the first quarter, but from there you have to build up customer confidence again."

Analysts and users, however, suggested last week that Wang's problems run far deeper than software fixes

See WANG page 119

Odd couple to battle Pentagon security plan

By Mitch Betts

WASHINGTON, D.C. — An unusual alliance of a civil rights organization and an electronic information trade group has begun a major political assault on the U.S. Department of Defense's plan to regulate what it calls "sensitive information" available from commercial data base services.

The Information Industry Association, representing on-line data base vendors, has linked up with the American Civil Liberties Union in an attempt to counter the Pentagon's stated intent to limit access to information that, while unclassified, is deemed by the military to be of a sensitive nature.

Jerry J. Berman, legislative counsel for the ACLU, said, "Any time you can have the traditional First Amendment coalition plus a high-tech business group, you have the potential for a powerful coalition."

The controversy was triggered by two related events:

the creation of a new information security category called "sensitive but unclassified" (CW, Nov. 24), and a Pentagon official's declaration last November that some controls would be placed on unclassified, on-line data bases to protect sensitive national security information from disclosure to foreign adversaries (CW, Nov. 17).

The IIA and the ACLU are forging a coalition that is expected to include the American Library Association, the American Association for the Advancement of Science and the American Newspaper Publishers Association, according to Kenneth B. Allen, IIA vice-president for governmental relations, and other sources.

Berman said the emerging coalition maintains the Pentagon has overstepped its bounds by attempting to restrict the flow of information that is already in the public domain. He said a public debate is needed to strike a balance

See ODD page 4

NEWS

IRS to clarify tax law change

Amendment threatens independents' status

By David A. Ludlum

Widespread confusion continued among independent computer professionals, their clients and their brokers last week as all waited for the Internal Revenue Service to clarify a change in the federal income tax law.

The IRS was working on the clarification of Section 1706 of the Tax Reform Act of 1986, which threatens the independent status of many of the independents. The section took effect Jan. 1.

IRS spokesman Wilson Fadely said he could offer no estimate of when the clarification will be issued or even what form it will take.

One of the major questions surrounding Section 1706 — whether it applies only to independents working through brokers, only to those working directly with clients or to both — remains unanswered, Fadely said.

Safe-harbor provision

Section 1706 removes the so-called safe-harbor provision that had shielded independent computer and engineering professionals from standards used to determine whether most taxpayers are employees or independent contractors.

Independents who without the safe harbor are found to be employees stand to lose many income tax deductions available to independent contractors and become subject to withholding for federal income and Social Security taxes.

Amid the vacuum of concrete information last week, independent professionals found themselves in varying circumstances, and brokers and employers addressed the confusion in different ways.

"Everybody's employer is treating the situation differently," said a consultant employed by a New York

computer services firm who was looking into independent work and requested anonymity.

"Some employers are holding part of contractors' pay in escrow against tax liabilities, while others are offering employee status at about a 20% cut from contract wages," the consultant said.

An independent consultant working at a Buffalo, N.Y., steel plant through a large computer services firm, who also asked not to be named, faced termination of his contract with the firm at the end of the week and the option of becoming an employee of the firm — at a 40% pay cut. He hoped to contract directly with the steel company but said the company did not know if the new law allows it to do that.

The consultant, who has set up his own corporation, said his biggest setback in becoming an employee would be losing a retirement plan, available to him as a business owner, that lets him defer taxes on up to 25% of his income.

Dan Victory, a Chapel Hill, N.C., independent consultant working at Gulfstream Aerospace Corp. in Savannah, Ga., was not working while he awaited clarification of the law. Some fellow contractors began working as employees, taking 8% to 10% pay cuts to cover tax withholding and benefits, he said.

Comsys, Inc., a Rockville, Md., broker for about 80 independent contractors, was doing business as usual and planned to ask the IRS to rule on its status, Vice-President Howard Stein said.

The firm was also seeking to form an association with other brokers in the area to hire a lobbyist to try to repeal the section, according to President Fred Shulman.

The St. Louis-based Independent Computer Consultants Association also was planning to try to overturn Section 1706 once the section has been clarified.

Atari, Commodore enter IBM PC-compatible market

By Douglas Barney

LAS VEGAS — Long-standing rivals Atari Corp. and Commodore Business Machines, Inc. will now do battle in the low-cost IBM Personal Computer-compatible marketplace.

The two firms previously fought to establish a foothold in the non-IBM-compatible market but last week joined the ranks of Victor Technologies, Inc., Amstrad PLC and Hyundai Electronics, all of which market low-cost compatibles through mass market channels.

The Atari machine comes standard with support of IBM's Enhanced Graphics Adapter (EGA). It will sell for \$699 with a floppy disk drive and monochrome monitor that supports EGA's 16 colors through the use of scales of gray. The product will be available through mass merchandisers and computer specialty stores, said Neil Harris, director of marketing communications for Atari.

Also last week, Commodore an-

nounced the PC10-1 and PC10-2. For \$999, users can purchase an Intel Corp. 8088-based system with five expansion slots and 512K bytes of random-access memory (RAM). The PC10-2 sells for \$1,199 and comes with dual floppies and 640K bytes of RAM. Commodore officials were not available for comment at press time.

Laser printer

In addition to its IBM PC-compatible, Atari announced a \$1,500 laser printer that works only with the Atari ST product line.

The laser printer is part of a complete desktop publishing system that Atari expects to sell for less than \$3,000.

According to Atari's Harris, the desktop publishing system is less than half the price of a comparable system based on Apple Computer, Inc.'s Macintosh and will be available only through computer specialty stores.

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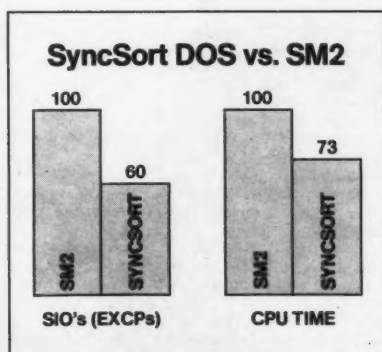
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NEWS

IBM mandates revamp of older 3380s in response to crashes

Estimated 40,000 units impacted

By Stanley Gibson

Seeking to avert possible head crashes, IBM is in the midst of replacing parts of the head-disk assemblies on some 40,000 storage devices.

The replacements, which an IBM spokesman termed mandatory under IBM's maintenance agreement, are intended to prevent crashes on three models of its 3380 2.5G-byte direct-access storage device (DASD): the AO4, BO4 and AA4 made between 1982 and 1985. These drives are no longer in production, and IBM's latest models, the D and E series of 3380s, are not affected, IBM said.

The head-crash problem stems from the release of two flame-retardant chemicals, antimony and bromine, that have been bonded to plastic parts of the air-intake assembly. Over time, the bonding can fail, allowing the chemicals to enter the system, build up on the heads and cause them to crash.

To prevent this occurrence, IBM is replacing four parts: the intermediate filter, the absolute filter, the J-tube and the plenum. All new assemblies use a bonding method different from the old method, according to an IBM spokesman.

"Only a very small percentage of drives have had problems," the spokesman said, but he declined to give a specific number. IBM, under

warranty, has replaced the drives that crashed, the spokesman added.

One user reported that 2% of his drives have failed and have had to be replaced by IBM. Ellis Stickels, manager of hardware technical service for Bank of America National Trust & Savings Association in San Francisco, said four of the approximately 200 AO4, BO4 and AA4 assemblies have failed since May 1986.

Jerry Ritter, manager of product planning at Sorbus, Inc., said his firm has noted a higher than usual rate of failure in the heads. "We have seen problems with this particular drive and have requested that IBM do something about them," he said.

At one Sorbus account,

Ritter said, his firm replaced two head-disk assemblies that failed. Every 3380 contains two head-disk assemblies, each of which costs \$35,000, he added.

Another customer, who asked to remain anonymous, said he experienced six crashes among 120 AO4s, BO4s and AA4s. The crashes occurred in late 1985, and IBM replaced the units in early 1986. He said he discussed the problem with a dozen other users who together had encountered some 48 crashes.

James Porter, president of Disk/Trend, Inc., a disk drive research firm in Los Altos, Calif., said, "I'm sure [IBM] must have found some sort of degradation that would haunt them, otherwise they

would not do this sort of thing," referring to the wholesale parts replacement program.

He explained that most assemblies would continue in use for several more years but would generally be replaced five years from now, so IBM must be certain the degradation would occur within that time.

The IBM spokesman said the current parts replacement is different from, but related to, a previous replacement program undertaken in response to head crashes on the same 3380 drives.

That problem was attributed to fungicides used in air-conditioning coolants that found their way into the drives' air-intake system.

Dbase to run with SQL

From page 1

While Ashton-Tate declined to comment on the timing of the next version of Dbase, a developer close to the firm said that Ashton-Tate tar-

geted a fall 1987 introduction. In addition, Robert Therrien, an analyst with Paine Webber, Inc., said Ashton-Tate had told the financial community to expect the product sometime this year. "We are well under way. We have a clear plan and design," said Roy E. Folk, executive vice-president for Ashton-Tate's Software Products Division, in an interview last week.

The second prong involves a development effort code-named Diamond. This is a data base product that will run only on Intel Corp. 80286 and 80386-based machines running a version of MS-DOS that Microsoft has yet to release. This program could make use of a graphical user interface similar to that of Dbase Mac, Ashton-Tate's data base for Apple Computer, Inc.'s Macintosh, sources said.

SQL will be implemented on both Nova — which many expect to be named Dbase IV — and Diamond. According to Folk, Ashton-Tate will use embedded SQL in the Nova product. "It will exist as a subset of the Dbase language and use all of the basic SQL primitives," Folk said. Based on Ashton-Tate research, Folk expects most users to use a combination of SQL and the Dbase language. "That is the most efficient," Folk said.

Ashton-Tate has felt pressure from its large corporate accounts and the investment community to move to SQL. "We are committed to SQL and recognize it as an MIS standard," Folk said.

Observers and data base experts believe that the improved Dbase interface is a direct response to competitive products such as Paradox from Ansa Software Co., which uses Query By Example (QBE), an interface in which the user gives the package an example of what he is looking for, and the product develops an algorithm to respond to the query.

But according to Folk, the menu-driven interface is in response to the growing base of new users. "We still believe that the most important audience is the new user. The market is vastly unpenetrated," Folk said.

While declining to give specific details, Folk said Ashton-Tate would implement a nonprocedural language, adding that QBE is a nonprocedural language. "You can already see some of that direction with the Assistant mode, pull-down menus and Framework-like extensions," Folk said, referring to the menu-driven front-end announced as part of Dbase III Plus. A former Ashton-Tate employee, however, told *Computerworld* that Nova would implement QBE.

A key concern of users is the inclu-

sion of a sophisticated compiler and an interpreter for Dbase. Folk declined to comment on a possible compiler and an interpreter but said, "Clearly, requests from developers and users indicate that we take a close look at approaches such as compilers."

According to a developer who has seen the specifications for Nova, the Dbase programming language will receive little attention in the next release. "There are some token things in there for the programmer, but there really are not a lot of enhancements to the language," said the developer, who asked not to be identified. "They will be putting in user-defined functions such as Clipper [a Dbase compiler from Nantucket Software] but with some limitations." One is the inability to call commands in overlays, he said.

Folk agreed that enhancing the programming language was not a major concern. "There were not significantly more commands that people wanted," he said.

Because of the addition of SQL and the enhanced user interface, Nova is expected to require at least double the memory needed to run Dbase III Plus. While Dbase III Plus requires only 256K bytes, Nova is expected to need at least 512K bytes. According to Folk, most machines currently sold have at least 512K bytes, and the cost of upgrading memory is continuing to decline dramatically. Folk declined to comment on Nova's memory requirements.

The product is not expected to be optimized to run under an operating environment such as Microsoft Corp.'s Windows or IBM's Topview. Both these environments take up valuable memory and do not run efficiently on Intel 8088-based machines, observers agreed. Folk added that neither Windows nor Topview has emerged as a standard operating environment.

A key goal for Ashton-Tate is to maintain file compatibility with the existing version of Dbase. Ensuring total compatibility with the Dbase command language is difficult, if not impossible, with the inclusion of SQL commands. "The embedded SQL would keep us from achieving total backward compatibility."

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NEWS

Lotus ships tools to create 1-2-3 add-ons

By David Bright

CAMBRIDGE, Mass. — Lotus Development Corp. last week began formally shipping some development tools that will make it easier for software companies and user corporations to create add-in programs for the Lotus 1-2-3 and Symphony integrated packages.

To give an idea of the many types of add-in products it expects to be developed, Lotus hosted 11 software vendors that showed products they have built using Lotus Developer Tools in assembly language. Lotus also announced that it is developing two new programs with Developer Tools — Speedup, for selective recalculation, and Learn, for building 1-2-3 macros.

Because the add-in programs can be tied directly to Releases 2.0 and 2.01 of 1-2-3 and Symphony code, users will not have to learn new interfaces, and developers can focus their efforts on the application, rather than the interface, said Ed Belove, vice-president of research and development at Lotus.

Specialized applications

Rather than just making templates for companywide distribution, Belove predicted that many more corporations will now make specialized applications for their specific needs. Belove said that some corporate developers, as yet unnamed, are already working on add-in applications that customize 1-2-3 and Symphony.

Belove and many software vendors said that 1-2-3 will increasingly be used as a central control program. "It's not an operating system, but it's a technology base for a wide range of PC applications," Belove said.

Paul Funk, president of Funk Software, Inc., added that the market for closely integrated 1-2-3 add-in products will be quite enormous. A good indication of the demand, he said, is that his company has sold some 220,000 copies of its Sideways utility for printing wide spreadsheets.

Funk Software will soon release the Noteworthy cell-annotation tool, the Inword word processor and a version of Sideways that lets users print documents without leaving 1-2-3.

Developer Tools, priced at \$150, represent a "lower entry barrier for developers," said Bill Lynch, head of Computervoice Corp. Computervoice sells a voice annotation add-in product for 1-2-3 and built Noteworthy for Funk Software.

The other developers showing available or soon-to-be-introduced add-in products were Amazon Systems, Inc.; Applied Decision Technology, Inc.; Blossom Software Corp.; Enfin Software Corp.; Informix Software, Inc.; KEL Systems, Inc.; Personics Corp.; Softbridge Microsystems Corp.; and Turner Hall Publishing.

The most popular category in the new products is word processing. Other products include relational data base management systems, a screen data compression package and a work sheet catalog system.

Metro sparks competition in RAM market

By Douglas Barney

CAMBRIDGE, Mass. — Competition in the market for random-access memory (RAM)-resident desktop managers will heat up with the announcement today of Metro from Lotus Development Corp.

The announcement marks the end of Spotlight, a \$75 desktop manager that Lotus acquired from Software Arts, Inc.

The Lotus product includes 12 functions, such as a text editor, calculator, Microsoft Corp. MS-DOS file manager and a watch.

The non-copy-protected product utilizes an interface similar to that of Lotus 1-2-3 and can be customized by the user.

The package uses a RAM-resident core program that controls the 12 components. Users can load the core and then load only the components they will need.

'Build-your-own product'

"It is a build-your-own product. Metro is basically an environment. You can use whatever pieces you choose," said Connall Ryan of product marketing, business applications group, for Lotus.

The package also contains a macro generator that records keystrokes and plays them back. The macro generator includes a command language that allows the user to automate data transfer between programs, the ven-

dor said.

In addition, users can create templates, custom menus and text screens for applications.

'A platform for other products'

Lotus hopes that other firms and users will develop applications that work with Metro.

"The technology forms a platform for other products. The specs of the Metro kernel will be released in six to eight months for developers," Ryan said.

Metro is currently shipping and requires 80K bytes of RAM to load the kernel, with more memory needed to load additional components. It costs \$85, and a hard disk is recommended.

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NEWS

Gateways provide dual link to Sperry, Burroughs systems

By Elisabeth Horwitt

WAKEFIELD, Mass. — Gateway products that connect both sides of the Unisys Corp. family through a local-area network were introduced last week by Applitek Corp.

The gateways, called Sperry NI10/G and Burroughs NI10/G, enable asynchronous terminals to access either type of host through Applitek's proprietary local-area network (LAN), Unilan, the company said.

Based on Applitek's existing NI10 line of network interfaces, the gateways provide solutions to organizations whose users want to access both types of hosts from the same terminal, according to Applitek marketing manager Jerry McDonald. "The government sector in particular has both Burroughs Corp. and Sperry Corp. installations," he said.

Mitre Corp., a nonprofit company that performs systems engineering and specifications for the Department of Defense, already is using Un-

ilan internally. Mitre "will consider the gateways' potential use in DOD installations that have Burroughs and Sperry systems," said Lee La Barre, who is a member of the Bedford, Mass., company's technical staff.

"Applitek has replaced direct terminal-to-host links with its Unilan local-area network, which offers an advantage in ease of moving devices around," said La Barre. "Burroughs does offer an Ethernet LAN connection, and Sperry computers can be linked to Ethernet through third-party vendor Bridge Communications, Inc., but Applitek's product may be unique in its ability to allow an asynchronous terminal to access both Burroughs and Sperry hosts."

Replacing direct terminal-to-host connections with Unilan increases maximum distance of the links from hundreds of feet to at least 20 miles more than the broadband version of the LAN, according to McDonald. Un-

ilan is a backbone network that supports baseband Ethernet 802.3 sub-networks and up to 60 assignable 10M bit/sec. broadband channels.

Proprietary protocols overcome the problem of increasing frequency of signal collisions that occurs on Ethernet LANs when distances between nodes go beyond a certain point, McDonald said.

"The gateways would be even more useful if you could use them to establish interprocess communications between Sperry and Burroughs hosts," commented La Barre. The solution is for Burroughs and Sperry systems to support common communications protocols, such as Transmission Control Protocol/Internet Protocol or Open Systems Interconnect, he noted.

Unisys currently offers "nothing similar to Applitek's products," according to company spokesman James Kenyon. "I'm certain there are customers of ours who could use the

gateways," he added.

The Sperry NI10/G Gateway uses a bisynchronous poll-select link to connect to either a Sperry DCP 10, DCP 20 or DCP 30 network controller, or to a Sperry Group Controller Secondary. It emulates Sperry's T-Mux terminal multiplexer when it communicates with the Sperry host.

The Burroughs NI10/G Gateway uses a poll-select link to connect to a Burroughs B874, CP3680 or CP2000 front-end processor. The gateway appears as one of the preceding Burroughs devices to a Burroughs ET1100, M7980 or TD830 terminal or to another Burroughs host. It provides Burroughs Display Station screen emulation for different types of asynchronous terminals.

Both gateways support up to 64 virtual circuits at a maximum speed of 9.6K bit/sec. Prices start at \$600 per connection for both the Burroughs and Sperry gateways. The products are available now.

MITCHELL J. HAYES

IBM reboots data dictionary

From page 1

did remark on the need for a repository-type function. Thomas R. Belz, with IBM's Information Systems Division in Rye Brook, N.Y., said IBM "recognizes that there are key customer requirements to provide repository capabilities. . . . To meet those requirements, one would have to provide the ability to define information for systems management or applica-

tion development purposes.

"Accomplishing this not only involves building a system repository capability but also identifying the information that needs to be stored in a repository," he said. "IBM has been working with customers for some time to understand and prioritize their requirements." Belz declined to say at what site this effort is centered.

Some observers warned against putting too negative an interpretation on the project's move. Michael Braude, vice-president of the Gartner Group, said responsibility for the Repository rests with three IBM devel-

opment labs, including both Raleigh, N.C., and Santa Teresa, "with nominal leadership in Poughkeepsie."

Sharon Weinberg, president of the Codd & Date Consulting Group in San Jose and a former IBM senior technical planner for DB2, said the shift does not necessarily negate the work done in Poughkeepsie. The Poughkeepsie effort centered on "what descriptors were needed to define each subsystem. That's a fairly sizable piece of work, and it can be transported [to Santa Teresa]," she said.

Nevertheless, all parties agreed the shift indicated at least a temporary setback for the repository. "There's going to be a delay, some throwing of stones back and forth. I'm sure that's taking place," one observer said.

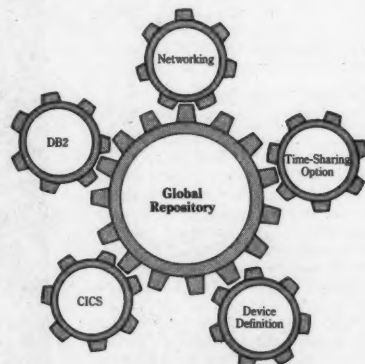
Poughkeepsie is the center of IBM's MVS operating system development. The repository project originally grew out of the need to integrate the many subsystems of MVS and IBM's Systems Network Architecture.

Weinberg described the Poughkeepsie work as producing a repository based on data entities and relationships when it needed to be based on the logical relations of a relational data base management system. "Any time a request was made for information, the request had to be translated to logical relations before it could be passed on to the DBMS. The same thing happened when the answer came out. You're paying an enormous penalty in terms of performance. It becomes an impossible bottleneck," she said.

Spokesmen for both Cullinet Software, Inc. and Applied Data Research, Inc. (ADR), both of which sell active dictionaries with their data base management systems, noted that their dictionaries manage application development and fourth-generation languages as well as data.

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Global repository IBM's super data dictionary concept



An IBM global repository theoretically would be a super data dictionary managing the data definitions and rules governing MVS subsystems, including DB2, CSE, TSO, CICS and software development tools. It would also be the central facility for network management and device definition, a set of tasks that IBM is apparently finding more difficult to accomplish than anticipated.

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SEA

NEWS

ETA delivers first field-test single-CPU supercomputer

By James Connolly

TALLAHASSEE, Fla. — What is reported to be the first field-test version of an ETA Systems, Inc. ETA-10 supercomputer was delivered last week to the Florida State University Computing Center.

The unit installed at Florida State is a single-CPU version, rather than the full 10-

CPU system that ETA Systems — the supercomputer group spun off from Control Data Corp. three years ago — expects to formally announce within several months.

Robert Johnson, vice-president of research and graduate studies for Florida State, said the university is awaiting delivery of three more

CPU's and a shared-memory facility, due to be shipped later this month.

Much of the university's supercomputing work is in support of a Department of Energy contract.

Early commitment

Johnson said Florida State ordered the four-CPU supercomputer in 1983 and has

been running an ETA Systems Cyber 205 in the interim. He reported that the university was chosen as a test site because it committed to the ETA-10 so early. The original \$13 million contract called for June 1987 delivery. The installation at Florida State gives an early look at the ETA-10's technology.

Johnson said the ETA pro-

cessor, like the processor of competitor Cray Research, Inc.'s Cray-2 supercomputer, is immersed in a coolant based on liquid nitrogen rather than using traditional coolant piping. The company claimed that a 10-CPU system will perform up to 10 billion floating-point operations per second (FLOPS), compared with the 800 million FLOPS maximum of the Cyber 205.

Performance match

Johnson said he expects the performance of each of his four CPUs to match the Cyber 205's performance. The installed CPU, which has 32M bytes of memory, uses only 240 chips, compared with 8,200 chips in the Cyber 205.

He also said the new system is much more compact than the Cyber 205. The ETA Systems' CPU is three feet by four feet by one foot, while the Cyber 205 was 17 feet long, 10 feet wide and seven feet high.

"It is performing far better than we expected," Johnson said. He reported the system was delivered on Monday and installed within hours. The coolant was added later in the week. He said the software that will be initially run on the system will be a combination of applications ported from the Cyber 205 and software chosen by ETA Systems.

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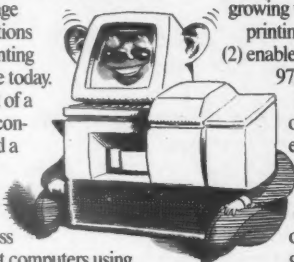
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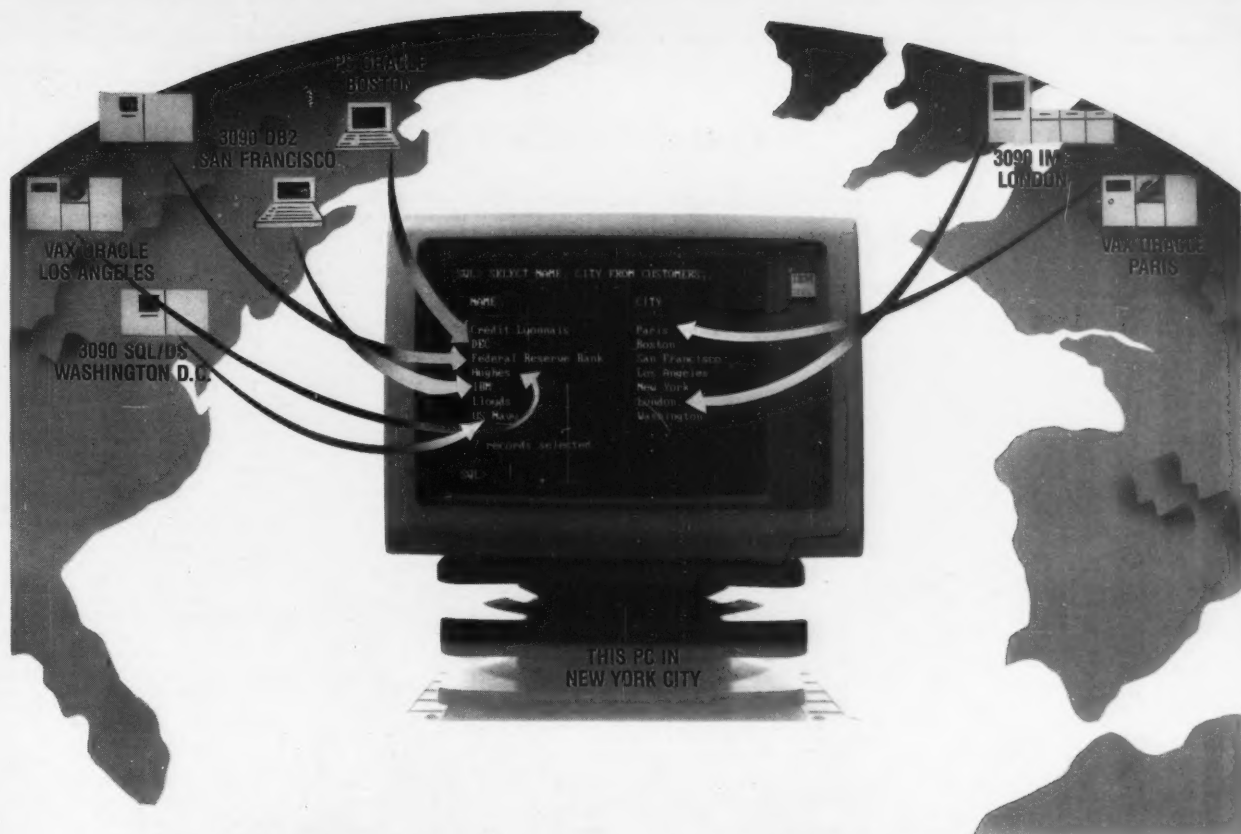
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NEWS

Codex enters X.25 arena as market braces for changes

Packet-switching tool could be money-saver

By Elisabeth Horwitt

CANTON, Mass. — Codex Corp. will make its debut today in the X.25 packet-switching equipment arena, at the start of what may be a shake-out, or at least a shaky time, for the industry, according to some analysts.

The Codex 6510 IXP, an X.25 network concentrator with some switching and packetizing capabilities, is the first of a projected series of Intelligent Network Processors targeting the X.25 market, according to Codex.

By concentrating incoming X.25

data streams from multiple terminals into one line, the concentrator is economical in two ways, according to product manager Barry Michaelson.

Funneling data streams

First, a concentrator installed at the host site can reduce port requirements by funneling multiple data streams into one host port. Second, it can concentrate data streams from geographically separated sites within a local access and transport area (LATA) before sending them to a host site in another LATA. This can save companies on costly inter-LATA telecommunications links.

The product can also help users economize on the cost of linking up

with a packet-switching network service, such as Telenet Communications Corp., by concentrating transmissions from multiple workstations or sites before sending them on to the nearest service node, Michaelson pointed out. Potential markets for the product include brokerage houses, financial firms and retail operations that need to collect information from point-of-sale and credit validation terminals.

The 6510 IXP can also act as a low-end switch, routing X.25 transmissions among a "limited number of nodes, say 10," Michaelson said. For larger networks, the concentrator can be linked up to a more powerful statistical multiplexer from Codex,

he added. The 6510 IXP supports Codex's proprietary Muxport protocol so that it can accept asynchronous transmissions from a Codex statistical multiplexer, add X.25 routing and handling information and send the packets over an X.25 network.

Codex decided to break into the X.25 arena with a concentrator because that is currently the fastest growing segment of the X.25 market, with an estimated 32% annual growth rate during the next five years, said Lee Sudan, Codex's director of wide-area network marketing. "Today, with X.25 interfaces on hosts from nearly every major computer vendor, there is a growing demand for X.25 products that function as network concentrators," he added.

A more pessimistic view of the X.25 market was presented by Paul Bell, president of New York-based consulting firm The 23K Group. The year "1987 is going to be brutal" for the X.25 equipment industry, claimed Bell, who has consulted on several businesses' packet-switching network projects in the past few years.

"A lot of small companies will fail, while large companies will either get out of the market or turn their packet assembler-disassembler operations into cash cows and cancel their product development plans," he said. "What's killing packet switching is the fact that everyone is waiting for Integrated Services Digital Network to arrive. That will make packet-switching unnecessary since it is an integral part of ISDN."

Ken Bosomworth, president of Norwalk, Conn., research firm International Resource Development, Inc., sees the X.25 service and equipment industry as in flux rather than in deep trouble.

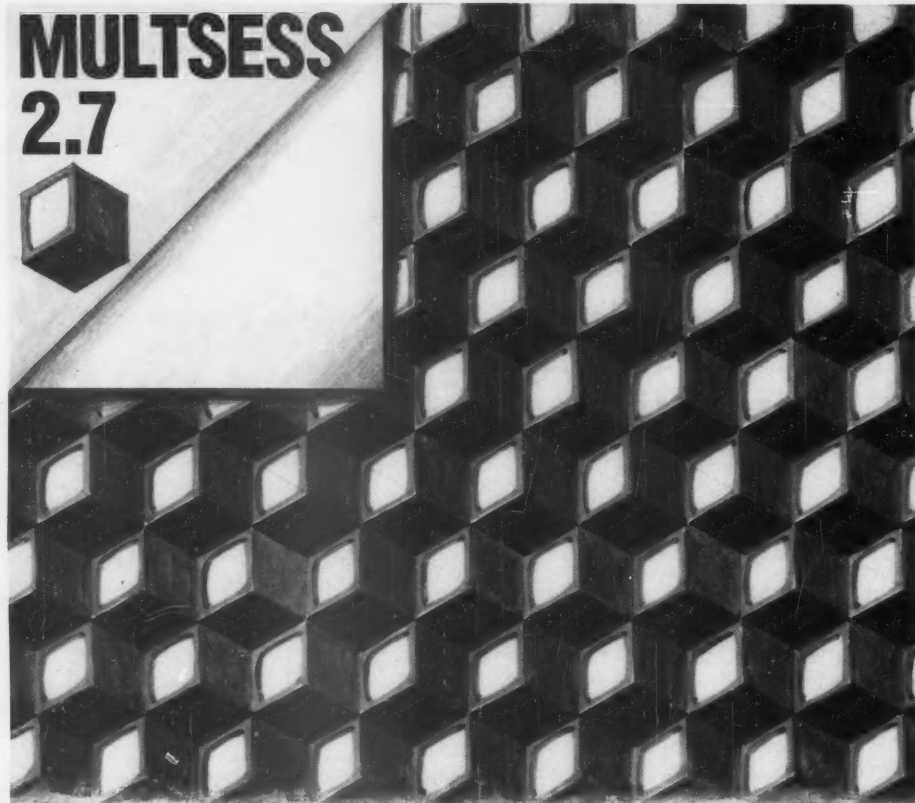
"On the positive side, IBM is rapidly making it simpler and cheaper for Systems Network Architecture communications to take place over public and private packet networks," Bosomworth said. "On the negative side, AT&T is developing technologies that will increase the transmission capacity of optical fiber by a factor of 100. The whole purpose of packet switching is to squeeze more stuff onto the same cable. If long-distance capacity becomes dirt cheap, the whole point vanishes."

ISDN to force change

Integrated Services Digital Network, according to Bosomworth, will not wipe out the packet-switching industry but will "force vendors to change their product lines" to meet the needs of the new networking environment.

The Codex 6510 IXP has an X.25 throughput of 500 packets per second. It features automatic rerouting in case of link failure, password protection for designated resources, network monitoring and performance optimization and billing/usage accounting. It has been certified by Telenet, as well as by packet-switching services in Canada, France, the Netherlands, UK and West Germany.

The product costs \$16,200 for two X.25/Muxport links and can be upgraded to support up to 28 links, each supporting up to 255 users with a total nodal capacity of 1,000 addresses. Availability is five weeks after receipt of order.



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NEWS

NCR focuses POS system on continuous processing

By Alan Alper

NEW YORK — Striving to bolster its leading position in the retail systems market, NCR Corp. last week unveiled a family of point-of-sale (POS) systems that support continuous processing operations.

Introduced at its sales office here, NCR's 7000CP comes in three versions and is aimed at mass merchandisers, supermarkets and department stores. The Motorola, Inc. 68000-based processors replace NCR's Models 1255 and 2153 POS systems that were introduced in the early 1970s and used transistor-to-transistor logic (TTL) and large-scale integration (LSI) technology, NCR said.

The 7000 family offers price/performance enhancements of roughly 25% to 30% more than the previous generation of products, said Charles Exley Jr., NCR chairman and president. Prices range from \$11,860 for single-processor versions to \$48,155 for the top-of-the-line system.

"Nothing is available in this price range that provides continuous processing," Exley observed. He said NCR expects to install approximately \$1 billion worth of 7000CPs over the product's life cycle. International Data Corp., a Framingham, Mass.-based market research concern, estimated that POS systems sales are expected to increase from \$370 million in 1985 to \$540 million next year.

NCR said it has installed 10 7000CPs worldwide at sites where customers have tested and subsequently purchased the system.

One of the earliest users, Cook-United, Inc., a Maple Heights, Ohio, operator of a 41-member chain of discount stores, installed a 7000CP at its Cambridge, Ohio, branch in October 1985. The 7000CP replaced a standard cash register system, said Larry Reznick, vice-president of MIS and distribution.

"The total cash control of the system is great. Our store manager swears by it," Reznick said. "It has also enabled us to increase productivity by providing information on each checkout lane, clerk and department. It helps us to determine staffing by telling us when volume is different by the time of day."

Reznick said Cook-United purchased the 7000CP in December and is considering purchasing additional systems for its other stores.

Market penetration

NCR said it expects to use technology embodied by the 7000CP to penetrate markets outside the retailing business. One area already identified is the banking market, Exley said, noting that the 7000CP is already installed in branches of a European bank that he did not identify.

"We see that marketplace as a good opportunity," he added. "We intend to use the 7000CP as a platform to sell systems into transactional processing environments where continuous processing is needed."

Using the firm's 68000-based Tower multiuser computer as a platform, NCR designed the 7000CP for high-speed transactional processing, using an open systems approach. The systems run both Unix and CP/OS, a proprietary operating system designed

for continuous operations in retail applications.

In the dual-processor configuration, the 7000CP's processors, memory, disks, software and data are mirrored for uninterruptible operation. If one processor stops, the other continues processing without operator intervention or performance degradation, NCR said.

The high-end 7032 is designed around the Motorola 68020 16- or 32-bit microprocessor running at 25 MHz. It is for use by large retailers that need exceptional terminal capacity or systems throughput or have large application processing requirements.

The entry-level 7010 is based on the 68010 16-bit microprocessor running at 8 MHz and supports up to 8M bytes. The mid-range 7011, targeted at higher volume small retailers, is based on a 10-MHz 68010 microprocessor and can address up to 8M bytes of main memory.

Four high-level programming languages are supported by the system: Pascal, C, Micro Focus, Inc.'s Cobol and Pilot. Each has its own set of debugging tools, although text editor and utilities are common to all four.

NCR also said it has developed three vertical-market applications packages. Additionally, in conjunction with 50 software tools and utilities available to enable retailers to tailor the 7000CP to a particular application or systems environment, remote mainframe software is being offered to provide for unattended operation.

NCR is offering three types of wide-area network communications to enable the 7000CP to communicate with remote mainframes. A gateway to IBM's Systems Network Architecture is available, allowing the 7000CP to transfer files or obtain credit authorization from a remote mainframe. Support for bisynchronous communications is also available for IBM 3780 batch and 3270 dedicated communications.

For managers, application programmers and cashiers, NCR offers a variety of interactive and programmable retail terminals. The programmable terminal — the 7052 — is based on the IBM Personal Computer AT-compatible NCR PC8. It provides local storage and operates in both on- and off-line modes.

The terminals range in price from \$3,125 in a unified configuration to \$4,555 for a programmable terminal. Three interactive terminals are currently available, while the 7052 and 7053 terminals will begin shipping in the second quarter and first quarter of 1988, respectively.

The terminals and other peripherals in a 7000CP system communicate via local-area networks (LAN). NCR is offering its Mirilan LAN, which supports up to 96 physical addresses, for clustered checkout environments in mass merchandisers and supermarkets. A Starlan-compatible LAN, supporting up to 256 physical addresses, is available in environments in which use of existing twisted-pair wiring is possible.

Mirilan is currently available, while Starlan is slated to be delivered in the first quarter of 1988.

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NEWS

Canaan adds processors, says 9370 legitimizes market

By James Connolly

TRUMBULL, Conn. — With claims that IBM's 9370 mid-range system announcement validated its own strategy, Canaan Computer Corp. last week introduced two additions to its family of departmental systems.

Canaan's DCS 6000 series, which includes two models, reportedly provides greater memory and disk capacities than did the DCS 5800 introduced a year ago. Like the DCS 5800, the DCS 6100 and DCS 6300 models are designed to run IBM VM/CMS software to support departmental end users in production mode and application developers.

Referring to IBM's October intro-

duction of the 9370 as a low-end IBM 370 architecture system, Canaan's Director of Product Marketing Richard Schreiber said, "We don't have to sell the concept of a low-end 370 market any more. Just by making their announcement, IBM made the market for us."

However, one analyst familiar with the Canaan announcement warned that the 9370 debut could hurt Canaan as well as validate the smaller company's market. "It's certainly going to make it a much harder sell for Canaan. In relation to where they were a year ago, they have made some progress, but in relation to the whole market, they are still kind of small," said Richard Mikita of

International Data Corp., a Framingham, Mass.-based market research firm. Mikita added that some of Canaan's success is a result of aggressive, one-on-one marketing.

Schreiber positioned the DCS 6000 series between the IBM 9373 Model 20 and the IBM 9375 Model 60 in terms of throughput performance, while claiming lower prices for the Canaan systems.

Available now, the DCS 6000 series uses the same core components as the DCS 5800, which can be upgraded to the new products with the addition of memory and replacement of disk drives. The new systems feature 4M bytes of cache on each disk controller. Canaan claimed the cache,

which is optional on the DCS 6100 and standard on the DCS 6300, improves performance by 30% to 50%.

The DCS 6000 series uses 5¼-in. disks rather than the 8-in. disks used in the DCS 5800. The DCS 6000 supports four to 36 users but features up to 16M bytes of memory and 3.4G bytes of disk storage. Schreiber said the DCS 5800, which was limited to 12M bytes of memory and 664M bytes of storage, remains in production.

The entry-level DCS 6100, with support for four users, 2M bytes of memory, a streaming tape drive and 170M bytes of disk storage, costs \$42,500. A 20-user DCS 6300 costs about \$80,000.

Schreiber also said Canaan is now delivering software to support IBM Systems Network Architecture, and that the DCS 6000 series can run IBM CICS Cobol applications at the department level with Unicorn Systems Co. VM/CICS, a recently announced CICS production environment.



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Multiplan 3.0 links files over network

By Peggy Watt

REDMOND, Wash. — Microsoft Corp. is scheduled to announce today a network version of Multiplan, its spreadsheet for the IBM Personal Computer and compatibles.

The new release includes a spreadsheet auditor, can record macros upon entry and can directly import ASCII files, enabling access to many microcomputer data base and large system spreadsheet data formats, said Pete Higgins, Microsoft group product manager.

On a network, Multiplan Version 3.0 supports multiple users with file locking, password protection and data encryption. The user can view as many as eight different worksheet files in windows simultaneously and link and consolidate several spreadsheets, Higgins said.

Multiplan now has some of the same features as the Microsoft spreadsheet Excel for the Apple Computer, Inc. Macintosh, Higgins added.

Both programs allow the user to view multiple files and include date and time formats for calculation.

"Multiplan also picked up some word processing type functions," Higgins said. It accommodates column widths of up to 64 characters and can print headers, footers and page numbers.

Multiplan 3.0 replaces Version 2.0, released in September 1985. It is available immediately for \$50 to existing customers, and it costs \$195 for new copies. Microsoft will ship to multiple sites for corporate users, Higgins said.

The Multiplan license allows one user per package, with additional licenses for network use available for \$95 each. As with earlier versions, Multiplan runs under Microsoft Windows.

NEWS

Feds back OSI standards

Will require vendors to put specifications in bids

By Mitch Betts

GAITHERSBURG, Md. — The U.S. government, a user organization with a \$16 billion information systems budget, is throwing its weight behind the Open Systems Interconnect (OSI) standards with a new contracting document that will require vendors to supply off-the-shelf networking systems that meet certain OSI standards.

Federal agencies may now incorporate the Government OSI Procurement (GOSIP) specification in bid requests at their discretion, but eventually GOSIP will be a mandatory part of government contracts, according to Shirley M. Radack, coordinator of standards programs at the National Bureau of Standards Institute for Computer Sciences and Technology.

In addition to saving money and headaches by buying open systems, the government hopes to use its clout to prod vendors into developing standard OSI products [CW, Sept. 8].

OSI is the seven-layer reference model for communications standards that has previously been established by the International Standards Organization.

MAP/TOP-compatible

According to the U.S. Government OSI Users Committee, GOSIP is compatible with the industry's Manufacturing Automation Protocol (MAP) and Technical Office Protocol (TOP) and will be updated as new OSI protocols are developed and approved.

For starters, the government is adopting the File Transfer and Access Management (FTAM) standard for file transfer and the Message Handling System (X.400) standard for electronic mail as well as X.25 for wide-area networking and the Token Bus (IEEE 802.4) for local-area networking.

"GOSIP addresses the need of the federal government to move immediately to multivendor interoperability without sacrificing essential functionality already implemented in critical networking systems," the GOSIP document said. It noted that the capabilities required by GOSIP "exist as standard products or are close enough to market that they can be proposed by vendors."

In 1988, the government expects to adopt standards for document interchange, transaction processing and the token-ring local-area network. Standards for graphics, the exchange of financial and management data, videotext and data base updates are slated for 1989. An Integrated Services Digital Network (ISDN) standard for voice, data and video traffic is expected in 1990.

The Dec. 18 version of GOSIP is intended for use in procurements of new networks of mainframes and minicomputers through September 1989. The National Bureau of Standards plans to adopt it as a Federal Information Processing Standard later this year, and the General Services Administration plans to incorporate it into mandatory procurement rules, Radack said.

"In the past, vendor-specific im-

plementations of data communications protocols led to isolated domains of information, very difficult and expensive to bridge," the GOSIP document explained. "By implementing open systems, the government expects to realize significant savings through reducing duplicate circuits and wiring, training, custom software, workstations and custom hardware interfaces."

However, some observers said the government faces a big challenge in standardizing on OSI, given the fact that many existing networks depend on the Pentagon-developed Transmission Control Protocol/Internet Protocol and IBM's Systems Network Architecture.

IBM cuts PC XT, AT prices

MONTVALE, N.J. — After slashing dealer prices on two IBM Personal Computer XT models earlier this month, IBM last week reduced the single-unit prices on two other XT models and one Personal Computer AT model by as much as 15%.

The three systems involved are the XT Model 286, the XT Model 089 and the AT Model 068. While low-priced clones have been steadily cutting into IBM's PC market share, the computer giant said it made the price changes as the result of a "normal business review."

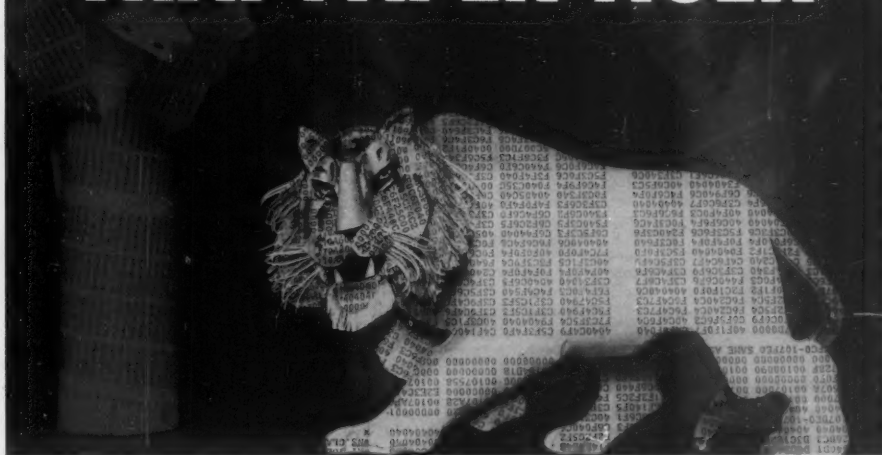
The price of the XT Model 286 with 640K bytes of random-access memory (RAM) and a 20M-byte hard disk drive fell from \$3,995 to \$3,395.

Introduced by IBM last September to fill the gap between the company's XT and AT models, the Intel Corp. 80286-based system has yet to achieve much popularity. The primary reasons cited by managers are the XT 286's slower performance relative to the AT and its inability to accept most add-in cards designed for the AT.

For an XT Model 089 with 640K bytes of RAM and a 20M-byte hard disk, IBM dropped the price from \$2,895 to \$2,660.

A low-end AT Model 068 with 256K bytes of RAM and a 1.2M-byte floppy disk drive now sells for \$3,395, compared with \$3,995 previously.

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VIEWPOINT

EDITORIAL

Some things new

The year 1987 is a special one for *Computerworld*. For one thing, it marks our 20th year in print. Given the frenetic pace of change that shapes and reshapes the environment of computing professionals, 20 years can seem like an eternity.

As a publication that has tried to stay a stride or two ahead of this change, *Computerworld* has gone through quite an evolutionary process of its own. During the next month, we will begin to unveil further changes in our editorial focus, composition and design and editorial staff size. These changes were born of a common impulse, namely the ever-dynamic needs of our readers.

The best and perhaps only solution to ensuring a publication doesn't fall behind its readers' needs is to throw greater resources toward its mission. Thus, we are increasing the size of our editorial staff by 15% compared with last year. A good portion of this increase will go to enhanced coverage of two specific areas: business microcomputing and networking. And with good reason, we think.

All available data points to rapidly increasing MIS outlays to cover the costs of supporting the burgeoning business micro-computer population. The very nature of the micro in a business setting is in transition, moving from the stand-alone, single-user mode toward composing the ever-widening bottom tier of the totally integrated computing environment.

Further, networking solutions are increasingly showing the way to more cost-effective use of the massive installed base of computer equipment.

Network management and development issues, heated quickly to the boiling point in a climate of communications deregulation, are perplexing at best and, at worst, untenable to information professionals.

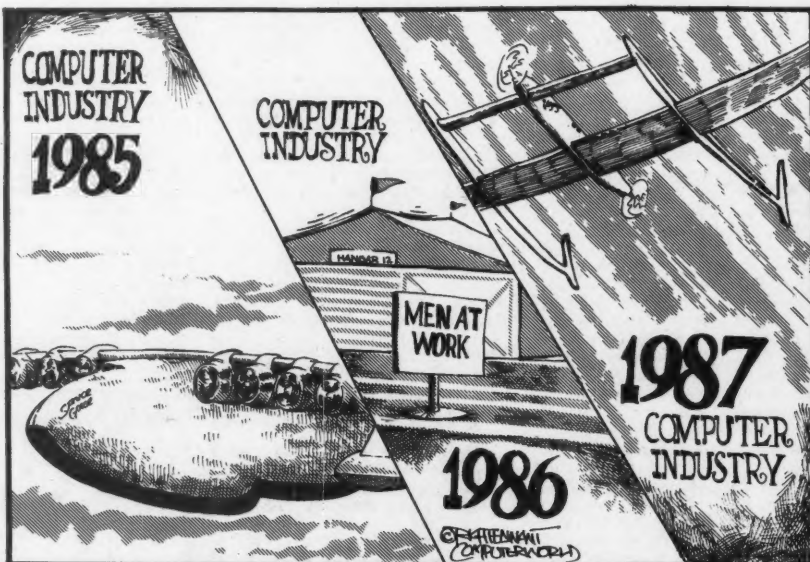
These are compelling reasons for boosting our coverage of these key areas. By increasing staff size, we will bolster our micro and networking coverage while maintaining other areas of coverage.

We have also opened an editorial office for the first time in Chicago. Our new Midwest correspondent, Jean S. Bozman, is now on board.

Each year we conduct extensive readership surveys, and year after year our readers rank comprehensive computer product coverage as their primary information need. So, while continuing with our coverage of new product information in the regular pages of *Computerworld*, we will launch a special supplement next week, inserted into the regular edition. This Product Spotlight section will highlight specific product categories — display terminals, local-area networks and PC storage devices. The supplement will feature a comprehensive set of tables listing vendors, products and product features as well as user stories and articles on technology trends.

With our Feb. 2 issue, readers will see a number of design changes, each intended to enhance the readability and overall appeal of *Computerworld*.

Ultimately, you the reader will judge whether these and other changes meet your needs better than *Computerworld* has before. Your phone calls and letters of critique would be, as always, a welcome barometer.



LETTERS TO THE EDITOR

Tax reform and DP free-lancers I

Computerworld deserves to be complimented for a fine piece of reporting in the article, "Tax reform dooms DP free-lancers" [CW, Dec. 15].

Our moral indignation should be aroused by this instance of technical service firms distorting the tax reform bill to their own ends. Apparently, they secretly pressured the Joint Committee on Taxation to add a clause that primary intent was to put most of their competitors out of business. It seems to be easier to do this than compete by offering a better product or service in the marketplace.

I have worked as a DP free-lancer for many years. If I wasn't good at what I do, I would not have survived in this role. In fact, several times I have been brought in to correct appalling mistakes that were made by employees of some of the larger consulting firms.

Independent consultants tend to have more years of experience and a larger variety of experience than the typical DP employee. If large vendors cannot compete effectively with free-lancers or with firms using them, then it is probably an issue of quality rather than price.

Section 1706 of the tax act is not just an effort to collect more taxes, it is an effort to keep a specific group of people from continuing to do business. For obvious reasons, this section was enacted secretly and without any debate. It is very frightening that as a nation we allow any group of people to be deprived of their livelihood so quickly and so easily.

Alida Jatch
Chicago, Ill.

Tax reform and DP free-lancers II

Computerworld's article summarizing how Section 1706 of the Tax Reform Act dooms DP free-lancers makes it clear the author does not understand the economics and taxation of subcontracting any better than Sen. Daniel Patrick Moynihan's (D-N.Y.) tax counsel, Joseph Gale.

In 1987, the combined employer/employee FICA tax paid by ADAPSO companies will be 1.5% more than the tax paid by the self-employed. By 1990, there will be no difference. Most high-tech professionals pay close to the maximum Federal Insurance Contributions Act (FICA) tax (about \$6,000 on \$43,000 income) whether or not they are employees.

Concerning other taxes, can it be proven that

the sum of the payments, from self-employed and the service firms, is less than the whole paid by the ADAPSO companies on the same revenue? With their expensive images and overhead deductions, employee-based firms may actually pay less tax. Exactly where is this alleged tax inequity?

It seems ADAPSO's real complaint is that the self-employed have Keough retirement plans and don't rely on the ADAPSO corporations to guarantee their futures. If our profession is exterminated, who will provide for the independents' retirement? Social Security? The technical service firms?

Maybe the ADAPSO companies feel an injustice exists because they squandered their resources convincing congressmen to eliminate the competition from a cost-effective alternative provided by legitimate entrepreneurs in an unregulated marketplace. If our better mousetrap threatens their monopoly, they should ask themselves why technicians won't be their employees, instead of manufacturing this tax inequity smoke screen.

Glenn Kerr
Glenn M. Kerr Associates
Alexandria, Va.

Telecommuting opens labor market

The cover story, "VAX boom triggers hiring war" [CW, Dec. 1], again proves that money isn't always the best way to attract and retain top-notch talent. Training people internally helps increase the labor pool, but this doesn't help employers fill today's critical openings.

In tight labor markets like this, savvy employers look for options that set them apart from others competing for the same scarce talent.

One such option is the selective use of telecommuting as a way to appeal to well-qualified people who can't, or won't, work in a traditional office setting.

Though it's far from the only answer to the VAX problem, employers who've tried this find it often opens the door to improved recruiting and retention.

It's a nice change, though, to find applicants seeking out employers who provide for telecommuting, instead of the employers doing the chasing.

Gil E. Gordon
Editor
Telecommuting Review
Monmouth Junction, N.J.

VIEWPOINT

Measure for measure: The decrease in information storage

A few weeks ago, I broached the subject of computer memory and storage by referencing an acronym being used in the laser and optical storage industry: LOC. LOC means Libraries Of Congress. This phrase is used to reference the potential size of laser-directed memory. We're talking big memory here.

This matter was brought to my attention by a gentleman I sat next to on the plane headed for Comdex. He was lamenting the fact that the old days were over, the days when you really had to be intimate with your computer — especially a personal computer — in order to optimize the potential of limited-memory machines.

Now, he said, you can get memory by the truckload for the price of a bag of doughnuts. Where's the struggle in that?

I, for one, do not like struggles. I like lots of memory, enough to sink a battleship when I can get it. Anyway, this plane conversation got me thinking about how far we've come to be able to reach the level of LOC.

The price we've paid

Later, as I looked around my office at all the paper, all the floppy disks and the 20M-byte hard disk, I began considering the price we've paid for our memory and data storage. I'm not talking about price in terms of the philosophical price we pay in life. I'm talking about cold, hard cash and credit cards. I'm talking dollars.

So I've decided to put all this LOC and data storage stuff into perspective.

Newquist writes and consults on artificial intelligence and other advanced high-technology topics from his office in Scottsdale, Ariz.

tive, starting with my office. I store all my important papers, from tax returns to grade-school report cards, in four four-drawer filing cabinets. Each cabinet cost me an average of \$110. Each has roughly 10 cubic feet of storage. So I've bought about 40 cubic feet of storage for \$440. Not too bad until you consider that there's nothing inside them for that cost.

Each of the 16 drawers is pretty full, and I figured that each drawer holds about five reams of shuffled paper. A ream equals 500 sheets of paper and typically sells for about \$6. Five reams per drawer times 16 drawers is 80 total reams for a final price of \$480 (not counting any printing or copy costs). So now I've got about 40,000 pieces of paper packed into 40 cubic feet of storage space.

Turning now to floppy disks, the calculations get easier. My word processing program saves about 150 pages per 5 1/4-in. floppy. A fairly good brand of 12 diskettes costs about \$25. (I know that you can get them for \$.73, but I have a fondness for disks that come with protective devices, like sleeves and boxes.) So, figuring I can get 150 pages to a disk for about \$2 per disk, it will take me 288 disks to store 40,000 pages. This at a cost of just under \$600. If you buy the disks mentioned above — with the box — the storage container is included. It will take 24 of these boxes to store my 288 disks.

So for \$600 and approximately a cubic foot of space, I have shrunk my storage space by a factor of 40 and my cost a few hundred dollars.

Now I go to my 20M-byte hard disk. I got it for \$400. Unfortunately,

it only holds 8,000 pages of information at a time, which means I'll need a total of five to store all of my information. That shoots my cost back up to \$2,000, and it will ultimately take up more room than my floppies. No apparent saving here, until you take into account that I don't like struggles, including searching through 288 floppy disks to find a file.

The name of the game here is convenience, and that's where the efficiency of hard disks lies. Think of all the manpower saved by not having to move from your chair to access all of your files.

This convenience brings us to laser and optical technology. Though still

in relative infancy, optical storage brings the promise of cheap storage and small space consumption.

The average optical storage disk runs about \$70 in the 5 1/4 in. format, which is the same size as compact audio disks. How many of these do I need for my 40,000

pages? One. Actually only part of one, but they don't sell them that way. Total storage space needed is about the thickness of three floppy disks. Now we're talking.

A recent advertisement in a laser industry magazine stressed the manufacturer's potential for putting the entire Library of Congress in a storage medium the size of a sugar cube. The Library of Congress contains all the published written material generated in this country and then some. This is the place where workers use roller skates in order to expedite your request for material.

Now imagine putting all the information contained in the Library of

Congress on something that could be crushed under the wheels of a roller skate.

Still, the key word above is potential. The sugar-cube technology is not commercially available yet, but it's getting close.

A company called Drexler Technology Corp. may well be putting a laser storage unit into your wallet in the near future. Drexler has developed the Lasercard, an optical read-only memory device that includes 4M bytes of memory on a piece of plastic that hides behind your American Express Card.

Internal transactions

These cards are already a big hit in Japan, where large banks are beginning to issue them to consumers for use as credit and debit cards in supermarkets and retail stores — without having to use cash. The Lasercard stores all of its transactions internally.

A number of U.S. hospitals are looking into using the card as a means to store patient data. Instead of trying to get bulky files transferred from doctors to hospitals and back again, the patient can simply produce the card, which will hold an up-to-date and comprehensive medical history in memory. You now have the opportunity to carry megabytes of information in your back pocket. Depending on who issues it to you, it may well end up costing next to nothing for all that memory space.

After all of this discussion, the guy next to me on the plane sighs and looks out the window. "I remember when I got my first 128K of internal memory," he says wearily. "Back then it was so much memory you didn't know what to do with it. You'd think, 'Wow, 128K! I could probably write a program to simulate God.'"



By HARVEY P. NEWQUIST

The distinction between 4GL and relational environments

I agree with Daniel Nolan's In Depth article, "Stone Age programming cripples 4GL environment" (CW, Nov. 17). Old habits die hard. But his imprecise and confused use of terms obscures a most important point: Fourth-generation language environments that are not based on a relational architecture bear their own responsibility for this situation. I would like to set matters right.

Nolan begins by recognizing that fourth-generation languages are one component of the new software technology; the other is the relational data base management system (DBMS). The important distinction here is between fourth-generation and relational: All relational products, DBMSs and language (there is only one relational language, IBM's SQL), are fourth generation, but most of the fourth-generation products are not relational.

In a relational environment, the

DBMS provides data independence and the language, SQL, is nonprocedural, with the effect of minimizing, simplifying and disciplining the programming necessary to develop, maintain and use applications. By contrast, in fourth-generation environments that are not based on a relational architecture the DBMS provides only partial data independence and languages are procedural.

Edgar Codd recently described how vendors of nonrelational products take pride in the numerous methods they provide for data representation through other than field content. For this reason, while any fourth-generation language environment is a significant, and needed, improvement over its second- and third-generation counterparts (such as VSAM/COBOL), without a relational base it will fall short in disciplining design and programming techniques.

Thus, it is the relational component in the new technology that is

critical. Yet Nolan keeps blurring the distinction between it and the fourth-generation language component.

Consider the following: "Fourth-generation language-based DBMSs offer more flexibility than their second-generation, nonrelational counterparts."

This formulation creates the impression that the main advantage of more modern relational DBMSs is that they support a fourth-generation language and that it is the fourth-generation language that provides flexibility.

Using fourth-generation language and relational terms interchangeably obscures the difference in impact the two components of technology have on design and programming techniques.

To understand that difference, consider some of Nolan's examples of poor techniques, such as overriding DBMS defaults for compression or field. Note that they pertain to the physical representation level. In a re-

lational environment, this level is handled entirely by the system, insulating the programmer and user from data storage aspects.

On the other hand, in nonrelational fourth-generation language environments, the incomplete separation between the logical and physical levels allows such techniques. If options for overriding defaults at the physical level are provided, programmers are sure to take advantage (or disadvantage) of them.

The subliminal blurring of the distinction between relational DBMSs and fourth-generation languages creates two negative implications.

First, it contributes to the "great deal of misunderstanding and misrepresentations" that exist in the relational data base management field, "one of the key technologies for the 1980s" (as C.J. Date has demonstrated).

Second, it obscures the responsibility that the (nonrelational) fourth-generation language products have for the persistence of obsolete programming techniques. Neither helps reduce inefficient programming.

READER'S PLATFORM

By FABIAN PASCAL

Pascal is an information specialist for the District of Columbia.

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HARD TALK

James Connolly

Optics takes new direction

Don't expect miracles, and don't throw out all of those silicon chips. But a new way of computing continues to edge its way through the laboratory.

The new technology is optical computing — which probably sounds as likely as optical communications did only a few years ago. The technology is seen by some supporters as an ideal means to implement massive parallel processing, since it apparently would not be limited by the interference problems related to using electronic circuits in parallel computers.

The latest developments in the optical computing field include the announcement that physicist S. Desmond Smith and other researchers at Heriot-Watt University in Scotland have produced logic circuits using optics. The development was welcomed in the general news media as a breakthrough, but some experts in the optics field add a note of caution. They say a stand-alone, optics-based computer is at least a decade away and that Smith's project is only one of many taking different routes to similar goals.

But Smith's claims provide food for thought for MIS managers who should be aware that a new technology is likely to be available in a decade or so.

"Optical computing is more of a direction than a thing," observes John Caulfield, director of the Center for Applied Optics at the University of Alabama in Huntsville. "Some of the brightest people in the world are taking it very seriously."

Caulfield warns that the researchers
See **OPTICS** page 23

Connolly is Computerworld's senior editor, systems & peripherals.

DEC adds real-time tools

Products include VAX 8550-, 8700-based systems

By David Bright

MARLBORO, Mass. — Digital Equipment Corp. last week increased its commitment to real-time VAX computing with the introduction of new system, board-level, workstation and software products. The new products will help to integrate real-time functions with non-real-time applications, DEC officials said.

"We are extending the capacity of our VAX systems across a broader range of performance spectrums," declared Ty Rabe, chairman of the real-time strategy committee.

Rabe stressed that DEC will not abandon its base of customers using the 16-bit PDP-11 minicomputer line for real-time applications and will continue to offer the systems. "We have no intention of moving people off of PDP-11s," he said. The VAX resources will be available for high-performance applications in which 32-bit power

is called for, Rabe said.

The offerings include VAX 8550- and 8700-based systems for real-time applications, a version of the VAXELN real-time software environment for software development, a single-board computer and enhanced Vaxlab scientific workstations.

Designed to run the VAXELN software environment, the RTVAX 8550 and RTVAX 8700 systems are targeted at such real-time applications as radar control and analysis, flight simulation and telemetry. They are said to provide up to six times the performance of the VAX-11/780.

Built around the VAXBI I/O bus, the systems feature a minimum of 8M bytes of error-correction code memory, a data acquisition rate reaching 5M byte/sec. on a single 32-bit channel and an overall system bandwidth of 60M byte/sec. The high bandwidth reportedly allows an application to have full use of the CPU and enables all I/O devices to operate simultaneously at maximum rates. Packaged with the VAXELN software, one VAXBI channel and an Ethernet controller, the RTVAX

See **DEC** page 23

INSIDE

Textet and Wang team up to market electronic publishing systems/22

Integrated Solutions upgrades its technical computer and workstation lines/22

NEW THIS WEEK

■ Philips and Signetics Microsystems adds to its VMEbus module line

■ For more on this and other new products, see pp. 83-98.

INSTANT ANALYSIS

"They are going in multiple different directions, all of which look promising."

— John Caulfield, director of the Center for Applied Optics at the University of Alabama in Huntsville, regarding the varied research efforts in the optical computing field

Gulfstream Micro introduces series of Intel-based supermicros

By James Connolly

BOCA RATON, Fla. — Gulfstream Micro Systems has introduced a family of multi-user supermicrocomputers based on the Intel Corp. 80386 and 80286 chips and running AT&T Unix.

The company is targeting the products at small and medium-size installations, including those using personal computer-based local-area networks. Company officials claimed a 50% performance gain and a 30% to 50% cost savings in comparison with those PC networks.

The low-end system is the SM 286/12, an 80286-based system designed for up to 12 users. It reportedly can support up to 15M bytes of random-access memory (RAM) and 256M bytes of hard-disk storage. This system runs Microsoft Corp. Xenix. A basic system with 1M byte of memory, five ports, one terminal, a floppy

disk drive, a streaming tape drive and 36M bytes of storage costs \$7,585.

The SM 386/20 is based on the 80386 and supports up to 20 users, according to the vendor. It supports 15M bytes of RAM and 600M bytes of disk storage. A system with 1M byte of RAM, an eight-port controller, a tape drive, one terminal and 72M bytes of disk storage costs \$16,695.

The SM 286/34, built around the 80286 and Intel's Multibus, is said to support up to 34 users. It reportedly can run up to four processors to handle five million instructions per second. It also supports 15M bytes of RAM and 900M bytes of disk storage.

An entry-level configuration consists of one CPU, 1M byte of memory, a 16-port controller, a floppy disk drive, 72M bytes of disk storage and a streaming tape drive. It costs \$24,995.

Firm predicts explosive growth for departmental computing

End users, makers will fuel increase

By Stanley Gibson

MOUNTAIN VIEW, Calif. — Forces are converging to push departmental computing to an annual growth rate of 43%, according to a recent report by Input, a research firm based here.

Sandwiched between mainframe processing and microcomputing in a three-tiered arrangement, departmental computing will grow at more than twice the rate of either of the other two levels from now through 1991, the Input report states. Input estimates that departmental systems

currently account for about 25% of all computing capacity, as measured in millions of instructions per second (MIPS).

From 1986 to 1991, departmental computing will increase sixfold, or 43% annually. This growth contrasts with a 12% annual increase predicted for stand-alone micro capacity and a 19% annual increase for dumb terminals connected to remote mainframes.

In the report, Input defines a department as an organizational entity that is headed by a full-time manager and is composed of one or more work groups that perform interrelated tasks. A work group consists of three or more people. Departmental systems include minicomputers, mul-

tiuser supermicros, personal computer-based local-area networks and micro-mainframe connections in which much local processing is done by the micro.

The growth in departmental computing is fueled by end users who demand more power and access to corporate computing resources and by computer makers able to satisfy those needs with price/performance improvements and communications advances, according to Input. Top corporate officers are also adding to the surge by demanding new departmental systems to gain a strategic edge, the report finds.

Departmental software use is also expected to increase, but at a slower rate than the growth of departmental

MIPS. Fortune 1,000 companies will increase their use of departmental software products by 32% annually for the next five years, increasing expenditures from \$2 billion annually to \$7 billion annually, according to Input. This compares with a projected 19% growth rate in the software market overall during the same time period.

The increased use of departmental computing hardware and software goes hand in hand with increased use of communications to tie the department into the corporate fabric. Users will be able to migrate easily across the personal, departmental and corporate computing boundaries, the study predicts.

See **EXPLOSIVE** page 22

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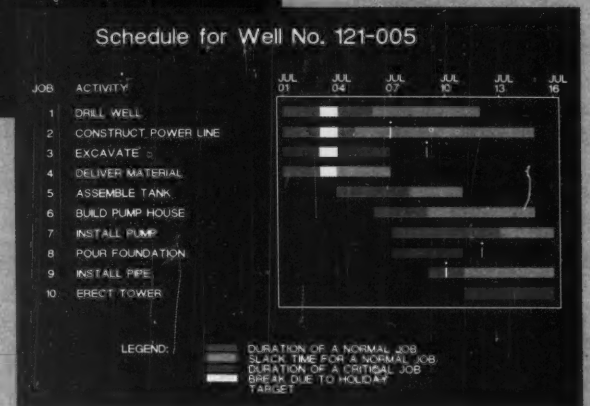
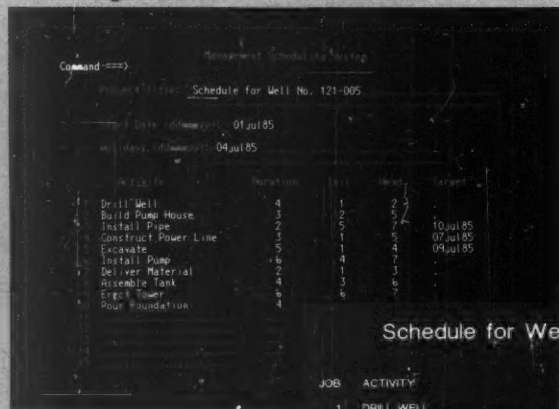
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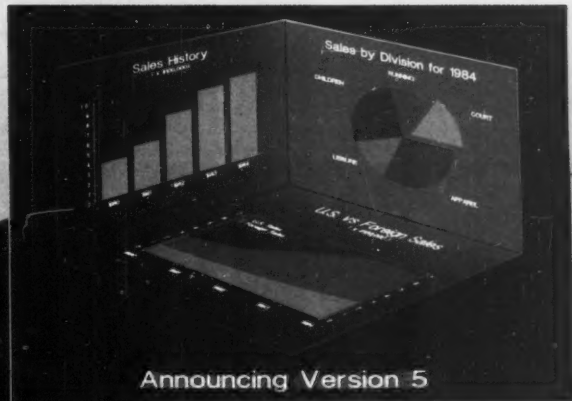
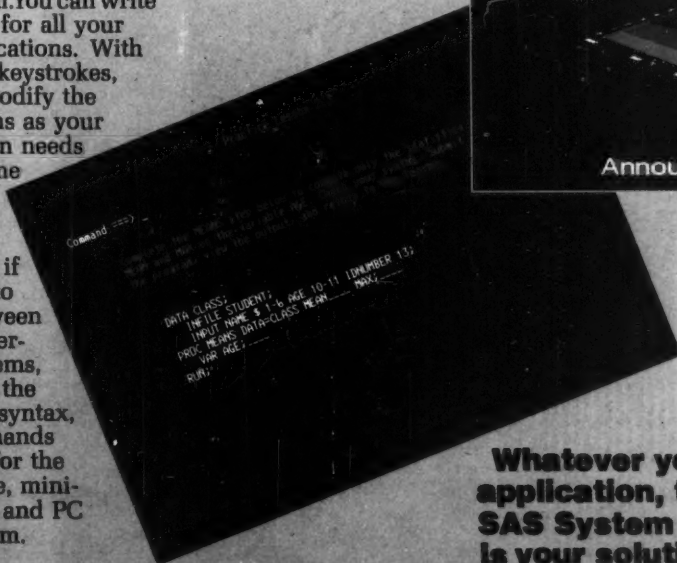
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SYSTEMS & PERIPHERALS

Textet, Wang agree to integrate systems

Will market electronic publishing software

By Eddy Goldberg

ARLINGTON, Mass. — Textet Corp., a vendor of high-end electronic publishing systems, has announced an agreement with Wang Laboratories, Inc. under which the two companies will integrate their technologies and products.

Under the agreement, Wang will manufacture and market electronic publishing systems that integrate Textet software with the Wang VS family of computers and applications software.

Wang will also distribute the systems worldwide. Textet will continue to independently market its Live Page 3300 and Live Page 9000 publishing systems.

Wang VS users will continue to input text documents as before. Those documents will then be sent to a Sun Microsystems, Inc. workstation, which is supplied by Wang under an OEM agreement with Sun and runs Textet software, said Jean Gard, marketing director at Textet.

Format to be converted

The Wang VS format will be converted via a software module that will insert generic codes into the document to allow editing and format-

ting with the Textet software.

The revised documents will then be sent back to the Wang system for output.

Both vendors support the Postscript page-description language from Adobe Systems, Inc. This support allows output to a growing number of typesetting and laser printing devices.

The agreement is the fourth for Textet, which is seeking to broaden its distribution channels through such arrangements.

Business relationships have already been established with Compu-graphic Corp., Sun Microsystems and the French company I3D/Framatome.

ISI upgrades technical tools, workstation line

By James Connolly

SAN JOSE, Calif. — Integrated Solutions, Inc. (ISI) has announced a series of technical computers and workstations designed to provide twice the performance of ISI's earlier Optimum V16 and V24 series.

The Optimum 400 series consists of three main processor models, all based on the VMEbus and a CPU board using Motorola, Inc.'s 25-MHz 68020 microprocessor.

A key feature of the 400 series is the integration of cache memory and the memory management unit, which ISI claimed allows translation of the virtual address and data collection within 60 nsec.

Eliminates redundancy

The series also features virtual direct-memory access, which reportedly eliminates redundant copying in the kernel's buffer area.

The three models are the 408, with eight slots; the 416, with 16 slots; and the 424, which features 24 slots. Memory ranges from 4M bytes to 56M bytes.

All models can be configured as clustered workstations, multiuser systems or diskless compute nodes on an Ethernet local-area network. They run the University of California at Berkeley Unix Version 4.2 operating system.

Configured as a system, the 408 costs \$18,500 with two 5¼-in. disk drives and a tape backup; the 416 costs \$20,500 with four 5¼-in. disk drives, an 8-in. drive and a tape backup; and the 424 costs \$25,500.

Explosive growth predicted in study

From page 19

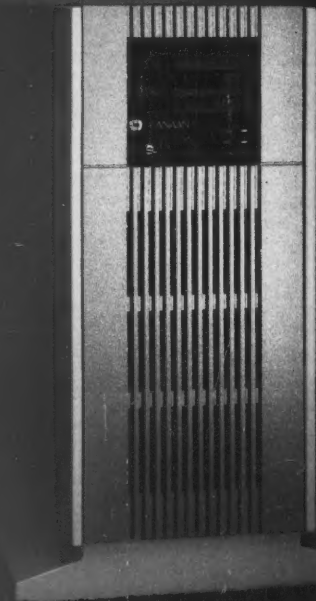
In addition, departmental systems will serve as gateways to other departmental or corporate systems. This will be due to increased operating system sophistication that allows inquiry and file uploading and downloading while still serving local processing, according to Input.

"Departmental systems derive their strength from being able to handle the complexities involved in intertier exchanges while remaining close enough and responsive enough to the individual user to be an excellent central source of computing power," the report states.

Further, as more powerful interconnected nodes increase in number, the corporate host will shrink in significance to the status of an equal node on the network — it will no longer be necessary to go through the host to access other nodes.

The results were obtained by interviewing a representative sample of current and potential departmental computing users as well as vendors of departmental computing products, such as IBM, Digital Equipment Corp., Wang Laboratories, Inc. and Hewlett-Packard Co., according to an Input spokesman.

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SYSTEMS & PERIPHERALS

Optics takes new direction

From page 19

in the U.S., Europe, Japan and the Soviet Union are approaching optical computing from a variety of angles, with none of those researchers having proven that their technology is the best way to proceed. According to Caulfield, "the most grandiose things" are 15 years away. But he also says specialized, hybrid systems will be available much sooner, perhaps moving out of the laboratory and ready to move into a production phase in a couple of years.

Optics industry watcher Drew Peck, a research analyst with the Stamford, Conn.-based market research firm Gartner Group, Inc., agrees that stand-alone optical systems are at least a decade away. "The way technology works today, it takes at least 10 years for something to move out of the laboratory," he says.

Peck observes that if Smith's circuits are entirely optical, with no electronic components, it is a true breakthrough. He says other re-

searchers have developed logic circuits using optical-electronic hybrid technology.

But Peck and Caulfield warn that even if researchers can develop workable circuits, they still face roadblocks.

Caulfield says many researchers are overlooking what he calls nitty-gritty details such as fault tolerance that must be worked out before a technology can be considered for commercial production. Peck adds that development also depends on how easily and how inexpensively a technology can be moved into the manufacturing phase.

So, while progress appears to be continuing and optics appear to have a place in computing, the technology still is something for the MIS world to monitor. It is too early to worry about having to make a commitment.

Xerox adds two 4045 versions

By James Connolly

ROCHESTER, N.Y. — Xerox Corp. last week introduced two additional versions of its 4045 Laser CP nonimpact printer, which was originally announced in April 1985.

One of the versions, the 4045 Model 50, features additional internal memory to support applications such as desktop publishing and printing complex graphics. The second version, the 4045 Model 20, has built-in circuitry allowing it to be attached to IBM cluster controllers for connection to IBM mainframes. Like the original 4045 model, the Model 50 and Model 20 can print up to 10 page/min.

The 4045 Model 50 supports a

minimum of 512K bytes of memory and can be expanded to 1.5M bytes. The original 4045 was available with 128K to 512K bytes of memory. Xerox officials said the additional memory in the Model 50 is intended to support applications such as Xerox Desktop Publishing Series: Ventura Publisher Edition.

The built-in circuits in the Model 20 eliminate the need to use a \$2,375 Xerox controller in situations in which users want to use a 4045 in IBM 3270 network environments. The Model 20 offers the same memory capacity as the Model 50.

The Model 20 costs \$6,495 and will be available in February. The Model 50 costs \$4,995 and is available now.

DEC adds real-time tools

From page 19

8550 begins in price at \$330,000; prices for the RTVAX 8700 begin at \$398,000.

Running under the VMS operating system, VAXELN Version 2.3 gives programmers access to the range of VMS development tools. Version 2.3 is said to enable the development of efficient runtime programs for applications such as factory automation and dedicated computer-aided design and manufacturing as well as large-scale data collection and reduction.

The Version 2.3 tool kit includes an extended EPascal compiler, runtime libraries for EPascal, C and Fortran 77 and a menu-building utility. Because of Version 2.3's built-in Ethernet support, programs developed on host VAXs can be distributed among network real-time nodes.

VAXELN Version 2.3 is priced according to the processor. Prices start at \$4,000 for Microvax II systems.

The KA620 single-board computer is designed for time-critical applications such as automatic test equipment, distributed factory automation and seismic data acquisition. It uses a modified Microvax II CPU with 1M byte of on-board parity dynamic random-access memory, a floating-point coprocessor and a Q-bus interface. Prices start at \$4,495 for a KA620 with a VAXELN runtime license.

Hardware and software enhancements to the Vaxlab Scientific Workstation reportedly more than quintuple the system's data acquisition speed from 500K byte/sec. to 2.8M byte/sec. The system can also acquire analog data as quickly as 1 million sample/sec., DEC said. DEC added that environments needing to acquire data with the faster workstations include electronics testing laboratories, mechanical testing laboratories and physics research. Prices start at \$33,455.

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SOFTWARE & SERVICES



SOFTALK
Marty Safirstein

Optimizing performance

Machine resource usage is one of the most overlooked issues of application development. Systems that process large volumes of data and are subject to tight processing constraints are particularly vulnerable to poor processing performance.

During 13 years as a business application consultant, I have frequently assisted clients in improving processing performance after their systems have been placed into production. The outcome has often been substantial redesign, reprogramming, additional cost and delayed implementation.

In most business applications, the bulk of processing time is spent accessing the data — finding, updating, creating and removing records. Far less time is spent manipulating the data within the CPU. Thus a primary performance objective is to minimize the data access. This translates into minimizing direct-access storage device (DASD) I/O, the more costly machine resource, and maximizing the CPU processing once the data has been accessed.

Achieving optimal application performance is an ongoing process during the life of the application. Performance optimization can continue throughout the system's life.

The application life cycle is generally viewed as having four primary stages: requirements definition; system design; programming, testing and implementation; and production processing and ongoing monitoring.

See **OPTIMIZING** page 27

Safirstein is a senior partner in the Chicago office of Computer Partners, Inc., a consulting firm.

Codd: Supra surpasses DB2

By Charles Babcock

SAN JOSE, Calif. — Edgar F. Codd, president of the Relational Institute here, has concluded that the next release of Cincom Systems, Inc.'s Supra is truer to the relational model than IBM's DB2, even though Supra still lacks a language comparable to IBM's SQL.

Codd reviewed the documentation for Cincom's Supra Release 1.3 and concluded that it adheres to 10 of the 12 rules with which he defined the relational model. Release 1.3 is being tested by Cincom and will not be available until June or July.

Codd compared Release 1.3 of Supra with Release 2 of DB2, which became available in March 1986. DB2 met seven of the 12 rules. IBM is widely anticipated to be preparing a new release of DB2 this year that might score higher if its documentation were available at this time.

"Supra's rating is the highest achieved

of all those I have reviewed to date. Assuming that the product performs according to the documentation, IBM's DB2 Release 2 has less fidelity to the relational model than Cincom's Supra Release 1.3," Codd said in a letter to David A. Wood, Cincom's senior product manager for systems software. Cincom had requested the evaluation.

Despite its high rating, Codd said Supra falls short on two points of the relational model as defined by his original 12 rules [CW, Oct. 14 and 21, 1985]. It lacks the equivalent of IBM's SQL data sublanguage and offers only partial capability to use high-level insert, update and delete commands.

A data sublanguage in particular is needed for effective data base management system use, Codd stated in one article.

See **CODD** page 27

VM Software upgrades systems software utilities

By Rosemary Hamilton

RESTON, Va. — VM Software, Inc. recently introduced new versions of five software programs for the IBM VM/SP operating system, including its data center management system, the core of its product line.

With Release 3.0 of VMCenter, a system administrator can now send reports on disk usage directly to users. The software has also been enhanced to include the monetary value of an individual's usage of the system.

VMCenter can be purchased as a package with such programs as VMBackup, VMSecure and VMSchedule that the vendor also sells separately. As a complete package, VMCenter sells for \$44,000, and the pricing is unchanged with the new release, the vendor said.

Pricing on individual packages also re-

See **VM** page 26

Software allows SQL use on PCs

By Charles Babcock

NAPERVILLE, Ill. — A software package that converts an IBM Personal Computer XT, AT or compatible into an IBM SQL training and development workstation is available for \$995 from DBMS, Inc.

The PC version of SQL, the data access and manipulation language, is compatible with IBM's mainframe version of the language, which is used with IBM's DB2 and SQL/DS relational data base management systems, according to Susan Miller, product manager.

Called SQL Workstation, the product is intended to allow new users to experiment with SQL queries and processing without tying up mainframe time. With a command syntax and data types that are identical to mainframe SQL, the PC product can be used to train new SQL programmers, Miller said.

Programmers can duplicate existing DB2 and SQL/DS mainframe applications

See **SOFTWARE** page 26

INSIDE

Celanese creates software subsidiary/26

NEW THIS WEEK

■ SDC Software adds Release 3.0 of its Customer Information System for IBM

■ For more on this and other new products, see pp. 83-98.

INSTANT ANALYSIS

"A number of acquired companies are being spun out of large, non-computer service companies. Examples include Information Associates by Westinghouse, Software International by GE and Mathematica and Oxford by Martin Marietta. These transactions confirm our long-standing belief that these marriages are extremely difficult to make work."

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SOFTWARE & SERVICES

Celanese enters software market with PC-oriented system

By Charles Babcock

NEW YORK — The Celanese Corp., a fiber and chemicals producer, has created Corporate Class Software, Inc., a subsidiary through which it hopes to enter the software business.

At the moment, the subsidiary has one personal computer-oriented product and a five-member direct sales force, which will double during the first half of this year, according to President Richard J. Lyons.

The company also has a \$1 million development budget that is being invested in contract work with MDBS, Inc. in Lafayette, Ind., the developer of KnowledgeMan, a data base management system, and Guru, an expert

system shell.

Celanese Chief Financial Officer C. Robert Tully, who saw a need to provide a standard financial information gathering and reporting system at the headquarters of his \$3 billion-a-year company, authorized a development team whose goal was to come up with one.

Consolidation a goal

One of the primary goals was to consolidate the information that was arriving at headquarters in multiple formats from the many divisions and subsidiaries of the company, Lyons said.

The in-house system, eventually to emerge as a PC product called the Fi-

nancial Application Solution to Analysis and Reporting (Fasstar), was initially designed as a mainframe system and converted to Microsoft Corp. MS-DOS in 1983.

Celanese then contracted with MDBS to create a commercial version of the product, which Corporate Class Software is scheduled to announce today.

Fasstar is able to automatically load data from Lotus Development Corp.'s 1-2-3 or Ashton-Tate's Dbase into its files, where it can be analyzed and organized into reports.

Unlike a two-dimensional spreadsheet, it uses four categories used by accountants and other financial analysts for organizing data: Schedule,

which includes income statements, cash-flow statements or balance sheets; Entity, which includes divisions and subsidiaries; Period, which includes quarterly, monthly and daily time frames; and Type, which includes actual, budget and forecast.

Lyons said Fasstar makes use of the MDBS DBMS — MDBS III — and can handle any standard ASCII files. Future products will address the Digital Equipment Corp. VAX market and will seek to make Fasstar function with mainframe accounting systems, Lyons said.

A department site license for Fasstar, including up to 25 users and a version for a file server, costs \$25,000, he added.

VM Software upgrades utilities

From page 25

mains unchanged with the new releases.

VMBackup was enhanced to include optional support of the IBM DOS/VSE operating system, which can run as a guest under VM/SP. VMBackup Release 4.2 allows a system manager to dump and restore DOS/VSE data sets. This optional support is priced at \$3,000. VMBackup sells for \$11,000, spokesmen said.

VMSchedule also has new support of DOS/VSE. This version provides for the scheduling and sending of jobs to the DOS/VSE environment. A license fee is \$9,000.

The capabilities of VMSecure have been expanded to allow managers at individual sites to assign access to users. Release 3.0 is said to be priced at \$19,000.

VMAccount now includes support of IBM's SQL/DS and Remote Spooling Communication Subsystems. It is priced at \$12,500.

Software allows SQL use on PC

From page 25

on the SQL Workstation and run them there, DBMS spokesmen said.

The workstation includes a set of development tools, a forms management facility and forms and system catalog utilities. The development tools can be used to create screens, forms and reports for an application prototype. The tools extend SQL commands to make SQL more of a development language than a data access language that relies on Cobol or Pascal for many program routines, spokesmen said.

The applications can also make use of mainframe routines and data, the spokesmen added.

SQL Workstation recently became available for shipment to customers, Miller said.

DBMS has previously provided applications development environments on the IBM PC for IBM's CICS and Cullinet Software, Inc.'s IDMS.

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SOFTWARE & SERVICES

Codd: Supra surpasses DB2

From page 25

A language like SQL enables programmers to "debug their data base statements interactively, treating them separately from whatever non-data base statements occur in their programs," Codd wrote. He called such a capability "a significant contributor to productivity."

A data sublanguage also provides a single tool for defining relations derived from the data base, Codd noted.

Wood said Cincom is developing a version of SQL compatible with IBM's version and the proposed standard from the American National Standards Institute.

The Cincinnati-based firm started out developing a proprietary language, Spectra, that was going to be enhanced "to solve the shortcomings of SQL."

"But the marketplace doesn't want us to solve the shortcomings of SQL. It just wants SQL," Wood said.

Addressing failures

High-level insert, update and delete commands will be part of Cincom's SQL look-alike, addressing the second point Codd said Supra failed on the relational test.

One of the key points on which Supra surpassed DB2 was referential integrity, or the ability of a system to check and see whether an expected relationship between data exists prior to processing, Codd said.

One Supra user — Edward M. Peters, manager of data administration

at Hershey Chocolate Co. in Hershey, Pa. — said Supra's referential integrity allows data base designers to "enforce the rules of the business right in the DBMS. . . . If you have it in the program control, it's hard to enforce across applications. If you have it in the DBMS, it's enforced all the time."

Using Supra in production

Hershey is using Supra in production systems, but Peters declined to specify what they are.

Codd noted that research has shown his rules on view updating and logical data independence cannot be demonstrated for every possible case.

"These rules will be rewritten in the near future," he wrote to Wood. DB2 failed both rules, while Supra received credit for meeting them.

Optimizing performance

From page 25

During requirements definition, a logical data model should be developed. First, the user should define the major components of data, how they are related and data volume statistics. The next step is to assign data attributes to these components via the rules of normalization.

In addition to the logical data model, user views of data should be prepared. These views describe by function how the components of the data model are to be accessed. Statistics defining how frequently the function will be performed and the function's time constraints should also be identified. For example, the function "find all orders for a specified customer" is expected to be processed on-line 5,000 times per hour between 8 a.m. and 4 p.m. with an average response time of three seconds.

During system design, performance estimating should occur to assess the technical feasibility of processing each critical business function.

This estimating process uses the logical data model, the user views, a set of I/O and CPU work units and the processing hardware environment to predict how long each function can be expected to take.

The work units represent I/O and CPU cost factors for various data types and are dependent on the data management software being used.

For example, the cost to "find customer by primary key" randomly in an IMS Hierarchical Direct Access Method (HDAM) data base can be predicted to require an average of 1.2 I/O and 5,000 CPU instructions. The number of I/O and CPU instructions can be factored to the processor and storage media speeds to predict elapsed time.

Estimations

Each function to be estimated is described in terms of its data access needs, the volume of records accessed and the probability of access. For example, the function, "create an invoice record for all customers that owe money," may be described with the data access steps of:

FIND ALL CUSTOMERS
FOR EACH CUSTOMER THAT OWES MONEY

CREATE NEW INVOICE RECORD
UPDATE CUSTOMER STATUS

Those functions exceeding the time constraints should be addressed before the system architecture is completed. The time constraint must be changed, the function must be modified to reduce its data access or the data model must be optimized.

Once all functions have been estimated to process within required time constraints, the data model optimization has been completed. After this step, the model is converted into the selected data management software.

During programming and implementation, the programmer should structure the data access commands to efficiently utilize the facilities of the data management software. As real data and processing volumes come to bear in production, the system must be tuned to efficiently process the live volumes.

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COMMUNICATIONS



DATA STREAM
Elisabeth Horwitt

Ma Bell, we miss you

When divestiture dethroned AT&T as the dominant power in the telecommunications market, many rejoiced. The phone company's rivals looked forward to competing on a more level ground and customers hoped for a greater range of services and lower prices in a new era of free enterprise.

While some of this has come to pass, AT&T's semibenevolent dictatorship had at least a few advantages for customers and even competitors. Those are missing in today's more democratic market environment.

What customers miss is the guarantee of cooperation and compatibility between AT&T's long-distance services and its errant former progeny's regional offerings. In predivestiture days, Ma Bell could ensure each new long-distance tariff would have its counterpart on the regional side. As soon as the tie was cut, however, the regional carriers became far less eager to follow AT&T's lead. The lack of local support has stymied more than one AT&T tariff proposal.

To cite one example, AT&T's Accunet Switched 56 was introduced in 1985 but is only beginning to take off now that users can access it through local Switched 56 services. AT&T has been ready for years to unveil a secondary channel-support feature that would provide crucial diagnostic and management features for Dataphone Digital Service. However, the feature only works if it is offered locally and, until

See **MA BELL** page 33

Horwitt is Computerworld's senior editor, communications.

AT&T cuts rates further

Long-distance charges to drop an average of 11%

By Elisabeth Horwitt

WASHINGTON, D.C. — In compliance with a Federal Communications Commission order, AT&T has added another \$650 million in rate cuts to the \$1.2 billion reduction proposed last November.

Approximately \$400 million of the latest cuts stem from further lowering of access charges to long-distance companies by the divested Bell operating companies, AT&T said. These latest access charge reductions were mandated by the FCC in December 1986.

The remainder of AT&T's rate reductions "relate to disallowances the FCC made to our estimated revenue needs in

1987," AT&T spokesman John Brooks said.

AT&T's current proposal, which supercedes reductions proposed by the company in November 1986, calls for a 14.5% rate cut for state-to-state long-distance calls during the day and a 9.3% reduction during evening hours. Overall, long-distance charges will drop by 11.2%, compared with the 8.1% average reduction proposed by AT&T in November 1986.

AT&T WATS and 800-service rates will be reduced by 4.6%. Megacom rates will be reduced 6.5% on the average; Megacom 800 rates by 3.9%.

The filing is the fourth major rate reduction that AT&T has made since divestiture. As a result of the cuts, the company's long-distance rates are 30% lower than they were three years ago, according to AT&T.

Netbios-TCP/IP standard coming

By Elisabeth Horwitt

MENLO PARK, Calif. — Standards for interfacing two popular networking protocols, Transmission Control Protocol/Internet Protocol (TCP/IP) and Netbios, should be finalized next month, according to the Netbios-over-TCP/IP Task Force. Networking products implementing the standards should become commercially available between two and six months after the specifications gain industry acceptance, industry spokesmen say.

Netbios-to-TCP/IP interfaces enable applications written for Netbios-based IBM Personal Computer networks to communicate with the growing number of computer systems that support TCP/IP, according to Daniel Lynch, president of the Cupertino, Calif.-based consulting firm Advanced Computing Environments and one of TCP/IP's developers. A standardized interface will enable different vendors' interfaces to communicate.

On Dec. 18, 1986, 25 task force members met at SRI International to "present, examine and initiate an agreement" on a proposed Netbios-to-TCP/IP standard. While "noting the remaining holes" in the 100-

page document, the members decided to make the specifications available for comment from the general community of vendors, users and researchers.

On file at SRI, the document can be sent electronically upon request. "We expect to get all of the meaningful comments in the first month," Lynch says. The task force plans to convene in mid-February, review the feedback and finalize the agreement. The agreement will be officially presented to the industry at the TCP/IP Interoperability Conference in March, "but vendors can start implementing the standard as soon as the ink is dry," Lynch notes.

The task force includes representatives from Ungermann-Bass, Inc., Communications Machinery Corp. and Excelan, Inc., all of which already have Netbios-to-TCP/IP interfaces. "It should take us six months at a minimum to implement the standard in our product," says Communications Machinery President Steven Holmgren. "We think we're closer to it than Ungermann-Bass."

Communications Machinery plans to implement a subset of the interface standard

See **STANDARD** page 33

INSIDE

Social Security Administration unveils its first automated office/32

NEW THIS WEEK

■ Quanta multiplexer family gives 3270 users options

■ For more on this and other new products, see pp. 83-98.

INSTANT ANALYSIS

"Because of the task force's level of technical exhaustion, the [Netbios-to-TCP/IP interface standard] document should go through; but there's a 100% probability that the computers will find something wrong with it."

Bar Durshtein,
manager,
product marketing,
Ungermann-Bass, Inc.

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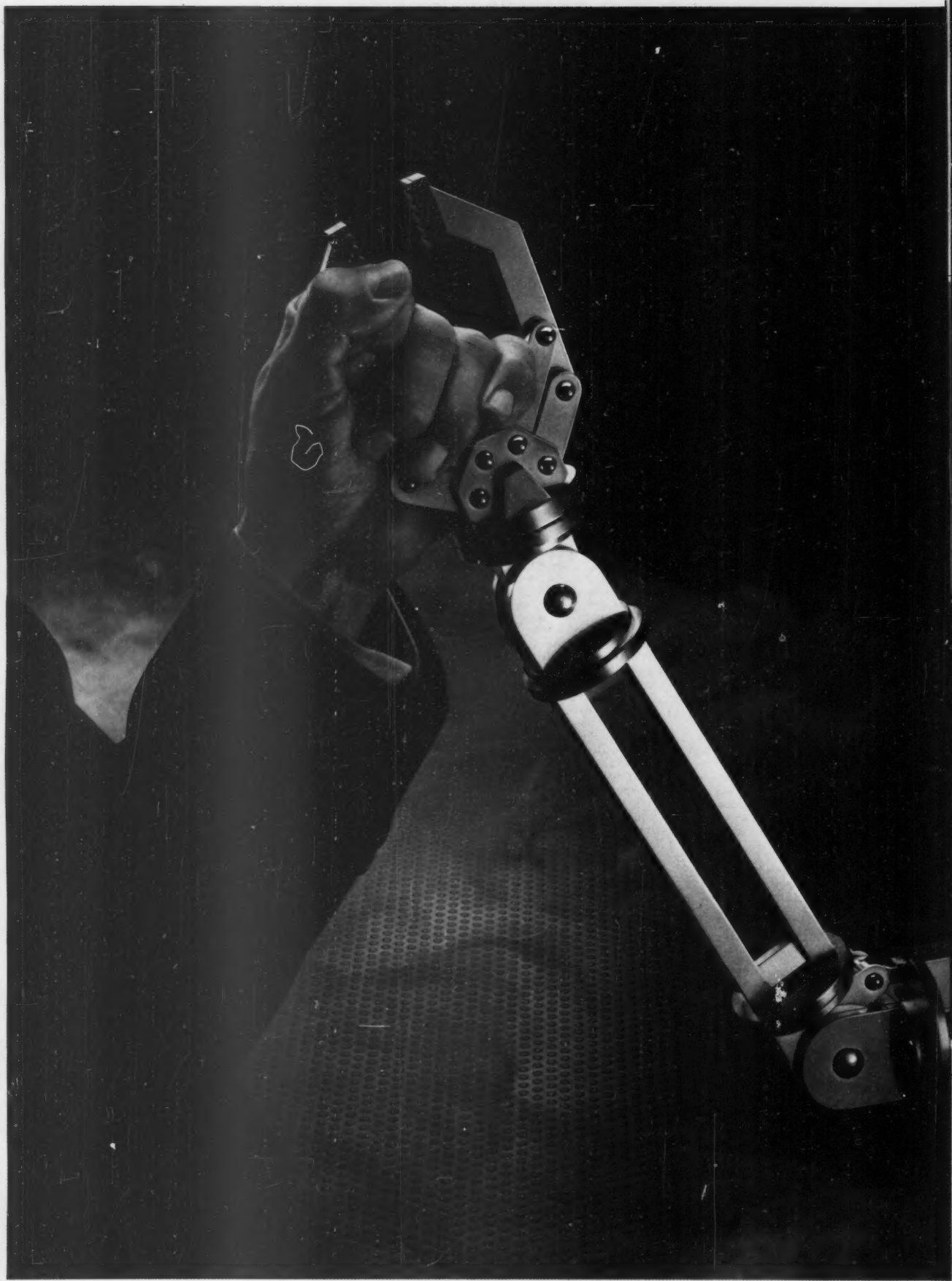
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COMMUNICATIONS

Social Security Administration opens first automated office

Service, accuracy should improve

By Donna Raimondi

MALDEN, Mass.—The Social Security Administration recently unveiled a fully automated office, the first of 1,340 that will convert from paper forms and typewriters to on-line terminal-to-host connections, the agency said.

The new on-line system eliminates all steps using paper, according to Dorcas Hardy, the agency's commissioner. It will handle claims, applications and status changes for Social Security's 37 million recipients.

In nonautomated offices, the staff writes new information on paper, transfers it by hand to a data sheet, and then sends it to a data entry person to be typed at a terminal into the system.

”

“We are not as advanced as we should have been, but we are getting there. With government procurement processes, by the time you get it through, it's obsolete.”

— Dorcas Hardy
Social Security Administration

After entry, the data is sent to the central IBM 3090 mainframe site in Baltimore.

The new offices include IBM 3179 color terminals, IBM 3268 Model 2 printers and an environment of furniture, sound-proofing and lighting that is shown to be conducive to productivity, Hardy said.

The conversion started in 1982 with the appropriation of \$500 million for needs assessment and awarding of the contract. The IBM contract includes 22,000 dumb terminals.

Communications run back and forth to the Baltimore center, but according to Hardy, the administration is looking at distributed processing arrangements for a later date.

With the new system, So-

cial Security recipients will be able to look up their own records rapidly and easily, Hardy said. The system will also shorten the time it takes to obtain a new Social Security number from the current 10 to 12 weeks to only 6 weeks, she added.

“We can now process 38,000 cards a night on the laser printer in Baltimore,”

Hardy said.

Going on-line should allow Social Security offices to handle client information with greater speed, Hardy said. Clients should get faster service and more accurate handling of their cases because of the elimination of transferring data from forms to terminals.

The system will also make

it easier to take claims by telephone. Hardy said she hopes to have about one-third of all claims handled by phone by 1990. That rate is now about 14%, she said.

Increased employee productivity is another expected benefit of the system. Approximately 12,000 positions will be eliminated nationwide between now and 1990,

most through attrition, according to Hardy.

The administration may go to intelligent terminals at a later date, Hardy said. “We are not as advanced as we should have been, but we are getting there. With government procurement processes, by the time you get it through, it's obsolete,” she said.

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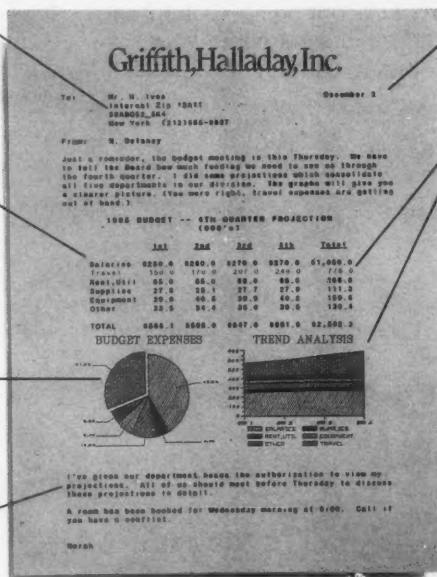
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COMMUNICATIONS

Ma Bell, we miss you

From page 29

recently, none of the regional carriers had it.

Telecommunications vendors and users are also suffering under predivestiture democracy because communications protocols are no longer dictated by AT&T.

"In the past, AT&T would

introduce new protocols and everyone would plagiarize them, after which AT&T would go around telling everyone the way it really was done," says Vick Boersma, Northern Telecom, Inc.'s manager of technical requirements, technology and standards. Now, while telecommunications vendors are technically free to invent their own protocols, market pressure says otherwise.

Customers are clamoring for the standardized world

of Integrated Services Digital Network (ISDN) that would allow them to integrate different vendors' offerings into a hybrid network with advanced management features.

In an attempt to meet this demand, telecommunications vendors are sending representatives to upwards of 70 committees, all of which are engaged in the "general intent to drive toward Open Systems Interconnect," according to Boersma.

But with AT&T no longer at the helm of the protocol development process, the push for standardization has repeatedly collided with solidly entrenched interests determined to make their particular protocols part of the standard.

Here again, the divested Bell operating companies are stretching their new muscles. They "do not like some of the compromises" incorporated into the existing protocols that define interfaces

between carrier and customer premise equipment, according to Boersma.

These protocols were agreed to when AT&T represented all of the carriers; as soon as divestiture freed them from AT&T's sway, the divested companies became set on revision.

Concurrent with the struggle with existing protocols is a far fiercer industry battle over the specifications for future ISDN capabilities. Since many of these features "have never been tried before," according to Boersma, contending vendors have plenty of scope to claim that their pet protocols are the right way to do things. While we wait for the victors—and a few usable protocols—to emerge from the dust of battle, some of us may sigh for the good old days of predivestiture.

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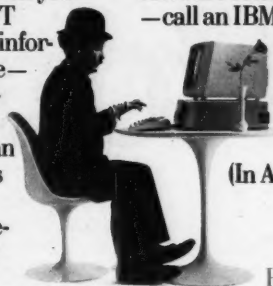
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Standard coming

From page 29

that defines communications that exist within one local-area network, Holmgren explains.

The portions of the standard that deal with communications between two or more networks "still have serious problems," Holmgren adds.

A fully functional interface will have the effect of "allowing applications written for Netbios to operate in TCP/IP's internetworking environment," according to Lynch.

Single network

However, Netbios was originally designed to operate primarily within a single network.


This factor makes it difficult to coordinate Netbios's resource-naming scheme with the resource-naming scheme of TCP/IP, Lynch admits.

That job will probably be left to the vendors, Lynch adds.

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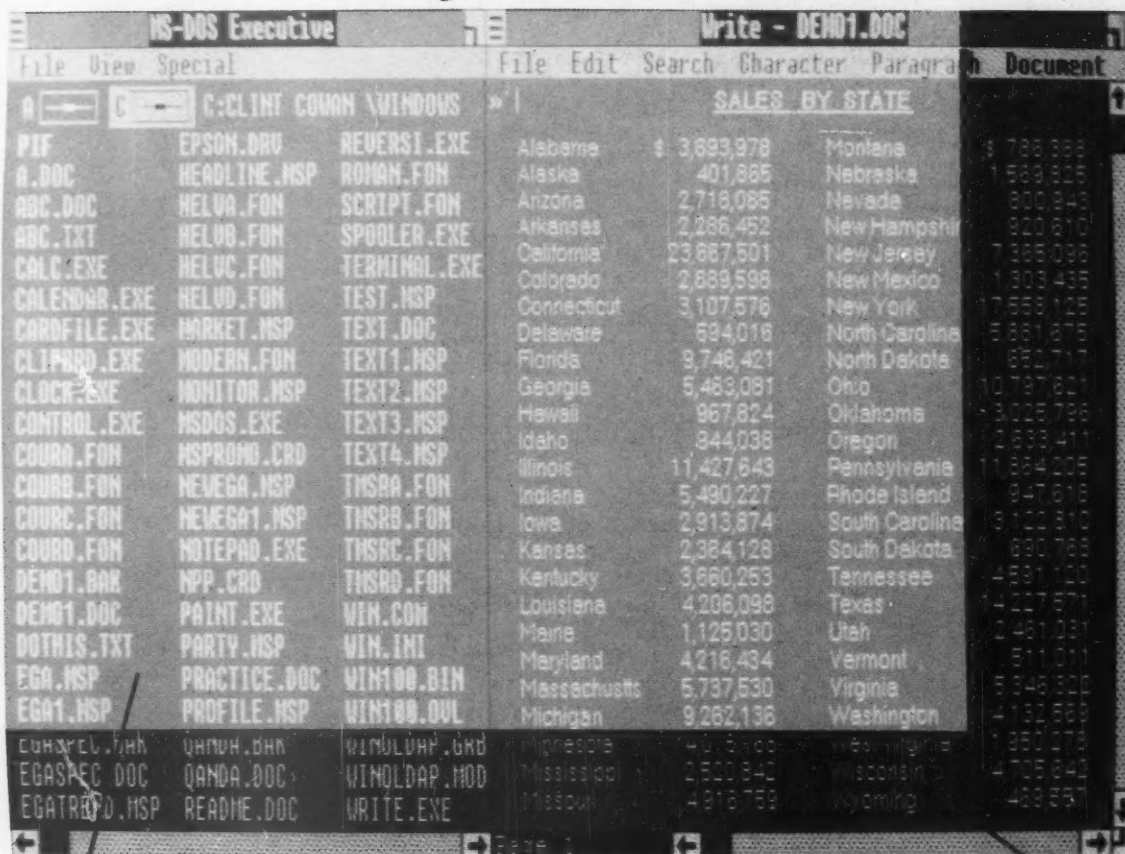
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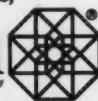
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MICROCOMPUTERS



MICRO BITS
William Zachmann

Macro mania

This is an era of personal computers driven by faster and more powerful microprocessors surrounded by more and more memory. As the capabilities of personal computers increase, software for them becomes more complex.

Many of the newer software products have required large investments for their development. Products like Ansa Software Co.'s Paradox, Javelin Software Corp.'s Javelin and Symantec Corp.'s Q&A are beyond the ability of one or two individuals to develop on their own.

Macropac's 101 Macros for Lotus Development Corp.'s 1-2-3, however, is a refreshing reminder that individuals with good ideas can still create useful and salable products. This \$49.95, non-copy protected package is the result of one person recognizing a product opportunity.

E. Michael Lunsford, president of Cupertino, Calif.-based Macropac, was business manager for Eaton Corp. in nearby Sunnyvale. As a user of 1-2-3, Lunsford was surprised to find that no one had thought of putting together a collection of useful 1-2-3 macros and selling it as a software product. So he did it himself.

Macros in their simplest form are just collections of keystrokes that are saved in advance and can be invoked as input to a program with a simple two-key combination. More sophisticated macro facilities, such as that in 1-2-3, include symbolic parameter options and

See **MACRO** page 40

Zachmann is vice-president of research at International Data Corp.

Micro firms charge piracy

Ashton-Tate, Lotus, others sue Canadian company

By Douglas Barney

VANCOUVER, B.C. — An informal consortium of seven large microcomputer software vendors, including the three industry leaders, has filed suit against Softsave Information Services, Inc. for allegedly renting out pirated software to customers.

According to Ashton-Tate, a plaintiff in the case, Softsave illegally reproduced micro software and rented the programs to users for \$15. Softsave specializes in software rentals.

But according to Softsave's lawyer, the copyright issue in Canada is still unresolved. "We are going to begin with the argument that there is no copyright in computer programs in Canada," said Robert MacFarlane, a partner with Fitzsimmon

MacFarlane, a Toronto-based law firm.

Under current Canadian law, however, there are copyrights for computer programs. The copyright issue is being appealed, and the decision on the Softsave case may rest on that appeal.

Other plaintiffs include Microsoft Corp., Lotus Development Corp., Lifetree Software, Inc., Infocom, Inc., Activision, Inc. and Broderbund Software, Inc.

Ashton-Tate removed copy protection from its products last year, making it easier to copy and therefore to pirate the firm's software.

Ashton-Tate is seeking as much as \$300,000 in damages from Softsave. The damages sought include those from copyright infringement, the profits of the operation, damages from conversion or the theft of the software and exemplary damages.

Softsave owners Eric Steven Sommer and Maureen Wilma Ribington were not available for comment.

Informix increases Lotus 1-2-3 users' access, storage ability with Datasheet

By Douglas Barney

MENLO PARK, Calif. — Informix Software, Inc. recently announced Informix Datasheet Add-In, a \$150 product aimed at users of Lotus Development Corp.'s 1-2-3.

The package will be available in the second quarter of this year and is expected to allow 1-2-3 users to store work sheet data in an Informix data base. "What the product is going to let users of 1-2-3 do is use that 1-2-3 environment they know so well to access data in a minicomputer-class data base system," said Laura King, vice-president of marketing for Informix.

According to Informix, Datasheet Add-In is the first in a series of relational data base products that will allow users to maintain a single source of data that can be extracted and manipulated by 1-2-3 work sheets.

"They can sit there looking at their Lotus work sheet and use the query form that they are used to and access data in the

data base, manipulate it, retrieve it and so forth," King added.

A key advantage of the product is that it allows Lotus users to work with larger files. "Users can operate on data files that are larger than they could have previously because they were constrained by the limits of what they could store in a work sheet," King said.

"Now they can store it in as big a file as they want on their hard disk," he added. With the product, users can store all work sheet data in one source.

Informix developed the product using the Developers Tool Kit from Lotus, a set of tools that allows developers to more tightly integrate applications with 1-2-3. Datasheet Add-In runs on IBM Personal Computers and compatibles that have at least 640K bytes of random-access memory and a hard disk drive. The package also requires Lotus 1-2-3. The product will be available directly from Informix.

INSIDE

Pecan broadens language offerings/38

Product offers risk-free software demonstration/38

NEW THIS WEEK

■ Granite Systems unveils PC-based personnel scheduling system

■ For more on this and other new products, see pp. 83-98.

INSTANT ANALYSIS

"Many of the applications that you are involved with will be subject to cannibalization by the PC revolution because of the PC's horsepower, local-area networking and increasing software sophistication. What we don't have yet is a way to market and sell it."

— Fred Gibbons, president of Software Publishing Corp., speaking to a group consisting largely of mainframe software vendors

Oracle's SQL*Calc makes a relational DBMS as easy as 1-2-3.

Oracle Corporation has developed a Lotus 1-2-3 compatible spreadsheet and integrated it with its ORACLE® relational database management system (DBMS). The new product, SQL*Calc®, is the first to combine a mainframe-class relational DBMS with an easy-to-learn and familiar PC spreadsheet user interface.

SQL*Calc is designed for 1-2-3 users who've run out of memory, flexibility and patience. SQL*Calc allows you to put SQL database commands into spreadsheet cells... just like formulas. This permits you to access large amounts of data directly from your spreadsheet.

Like all Oracle Corporation products, SQL*Calc runs identically on mainframes, minicomputers and PCs.

SQL*Calc's foundation is the ORACLE relational DBMS, which pro-

vides users with a complete set of SQL commands through which they can create, retrieve, modify and otherwise control their data. SQL is the industry standard database command language for large computers. The SQL commands available in ORACLE are identical to the SQL commands in IBM's premier mainframe relational DBMS products, SQL/DS and DB2.

Based on this powerful DBMS foundation is a Lotus 1-2-3 compatible spreadsheet that allows users to put SQL commands into spreadsheet cells in the same way as they enter formulas.

When a SQL command for data retrieval is entered into a spreadsheet cell, information is automatically retrieved from the database and placed into the spreadsheet. SQL*Calc also permits users to modify the database and even create new database tables—directly from the spreadsheet.

SQL*Calc is easy to learn because its menu and command structure are compatible with those of Lotus 1-2-3. And SQL*Calc's ORACLE DBMS requires no supplement: It is vastly more powerful than the database components of 1-2-3, Symphony, Framework, dBase II, dBase III, or any other PC DBMS.

SQL*Calc is available immediately for IBM PC/XTs and ATs for \$995.* SQL*Calc will soon be available on a wide variety of systems, including IBM mainframes, DEC, DG, and other superminis, and most UNIX systems.

For further information, or to order your copy of SQL*Calc, call 1-800-345-DBMS. Or write Oracle Corporation, Dept. CS, 20 Davis Drive, Belmont, CA 94002.

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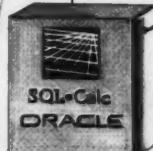
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MICROCOMPUTERS

Firm bolsters development line with integrated software

Language products key to Pecan strategy

By Douglas Barney

BROOKLYN, N.Y. — Pecan Software Systems, Inc. recently introduced several new products, including a version of the Modula-2 language, and reintroduced Jack2, an integrated software package.

The new products, along with a rash of product upgrades, give Pecan a wide variety of language offerings, the firm claimed.

"The key thing is that we now have a program development environment with an integrated family of

development tools and languages that is machine independent," said Eli Willner, vice-president of research and development for Pecan.

According to Willner, integration of the firm's language products is a key part of Pecan's strategy. "Each compiler knows about the others. You can write part of your application in Fortran and call it from Pascal," he said.

Pecan's Modula-2 was acquired when the firm purchased the assets of San Diego-based Volition Systems. "We took their compiler, which is one of the first Modula-2 compilers for micros, made it compatible with our current release of the Power System and brought it up to date with

the latest standard for the language," Willner said.

Pecan now offers Modula-2 for \$99 when purchased as part of the Power System, Pecan's integrated family of development tools. "When you buy a language, you get a text editor, file-handler utilities and graphics utilities," Willner said.

Pecan also recently announced PDQ Pascal, a \$69 version of USCD Pascal aimed at novice programmers. "It is an almost full implementation of the language which is designed for the beginning programmer. It comes with one disk instead of three and a tutorial manual," Willner said. "If a corporation is starting a training program in Pascal, this is an ideal thing

to use because the course ware is actually part of the product."

According to Willner, a full 32-bit Power System will be released in mid-1987 and will be targeted at Motorola, Inc. 68000-based and Intel Corp. 80386-based machines.

The firm also upgraded its Fortran 77 and its implementation of USCD Pascal for Apple Computer, Inc.'s Macintosh.

Jack2 was written in USCD Pascal and includes word processing, spreadsheet, data base and graphics. Jack2 will sell for an introductory price of \$49. Pecan acquired the package from the now-defunct Business Solutions, Inc. in Kings Park, N.Y.

Demo service takes risk out of purchases

By Douglas Barney

A service called Previeware, designed to eliminate the costly purchase of the wrong software package, was recently unveiled by Winston & Winston, Inc., a Fort Worth, Texas-based publicity and marketing communications consulting firm.

"From the end-user perspective, the only way to find out if a particular software package was right was to buy it and try it," said Marty Winston, president of Winston & Winston. "At that point, you are at the point of no return."

Winston encountered this problem and had to give away his first word processing package when it did not satisfy his needs. "There has got to be a way to get a flavor for software without the risk," he contended.

The service, which is available through The Source under the IBM SIG, provides demonstrations of software packages that users can download. "These are not just slide shows, but functioning demos that are distributed free," Winston explained. Vendors can participate in Previeware free of charge. Winston is hoping to spread the service to both CompuServe, Inc. and Telenet, Inc.

There are several criteria vendors must meet in order to participate in Previeware. "The demo in and of itself must be of value to the guy who gets it whether or not he decides to buy the full program. Before we compress it for uploading, it has to be under 400K bytes. And the last stipulation is there must be an incentive to purchase the full package and continue using the Previeware vehicle," Winston said.

Such incentives include cash discounts directly from the vendor, a coupon the user can print out to receive a discount from a computer dealer or a rebate, he added.

Tools available on Previeware include 1st Class from Programs in Motion, Professional Tax Consultant from Stallion Software, Inc., Save Our Spreadsheet and Goldata Base from Goldata Computer Services, Inc. and eventually TKSolver from Universal Technical Systems.



MICROCOMPUTERS

Generator eliminates coding, compiling

By Douglas Barney

IRVINE, Calif. — Aker Corp., a software start-up with roots in Israel, recently announced a data base and applications generator that does not use a programming language.

Called Magic PC, the \$695 product allows users to develop applications by filling in information banks and execution tables. Instead of using a language specific to a data base product, the developer highlights selections from pop-up menus. The package then puts this information into one file that includes both the program library and the data base.

According to the company, the major burden for users is system analysis rather than programming. "The

major thrust of the product is to save a considerable amount of time in developing applications. You don't write code or compile," according to A. Miko Hasson, president of Aker and an author of Magic PC.

The User Exit feature allows the user to integrate spreadsheet, accounting or word processing applications into the firm's data base environment.

Magic PC was developed in Israel, and has been used extensively by the Israeli Air Force and a number of commercial companies.

The product was written using Microsoft Corp.'s Pascal.

Magic PC can handle up to 20 open data base files simultaneously, with

a maximum record size of 2K bytes. Maximum keys per file is 24, the maximum segments per key is 10 and the maximum key size is 250 bytes.

Magic PC's file and record locking features support Novell, Inc.'s Netware networking software.

The package runs on the IBM Personal Computer and compatibles and requires 512K bytes of random-access memory and a hard disk drive.

A demo version of the product, limited to 100 records, is available for \$19.95, and Magic Run runtime modules sell for \$95 each. The product is available either through value-added resellers or directly from Aker. The \$695 version includes a local-area networking feature.

Package adds AI technology to applications

By David Bright

NORWELL, Mass. — Solution Systems has introduced a Common LISP package that allows the integration of LISP and C code on a personal computer. With the package's interface to Microsoft Corp.'s C language, programmers can customize LISP or combine C functions with LISP programs.

Called Translisp Plus, the \$195 package is "geared to adding artificial intelligence technology/techniques into existing applications or for creating new applications," according to product manager Tristan Knapp. The company claims its new package is the only Common LISP-compatible package that integrates Common LISP and C.

The package includes more than 400 Common LISP primitives. Programs carefully written with the interpreter can reportedly be ported to any other Common LISP system on a microcomputer, minicomputer or mainframe. Users can create their own built-in primitives and also integrate code from third-party C libraries, the company said. The package comes with 30 sample programs intended to give novice users an understanding of LISP programming techniques. Additional features such as debugging tools, an integrated editor and cross-reference facility are aimed at experienced programmers.

A runtime interpreter that enables consultants or managers to distribute executable versions of programs is available for \$150.

Translisp requires an IBM Personal Computer or compatible system with at least 320K bytes of random-access memory.

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Multitasking PC tool out

By Douglas Barney

TARRYTOWN, N.Y. — Lifeboat Associates recently unveiled a development tool that provides multitasking and real-time event processing for applications.

Timeslicer is a \$295 package for IBM Personal Computers and compatibles that works with Lattice, Inc.'s C Compiler and Lifeboat's Advantage C++ preprocessor/translator that supports object-oriented programming.

"There are a lot of applications where people would like to be doing some background task. Most of the world is waiting for ADOS [a name given to Microsoft Corp.'s unannounced multitasking operating system for Intel Corp. 80286 and 80386 machines], but there is an enormous base of PC XT-class machines. The world is not going to immediately convert to 286/386 machines," said Edward H. Currie, chairman of Lifeboat.

The real-time event processing capability allows C functions within the application to complement or replace any interrupt service routine.

MICROCOMPUTERS

Spooler reduces Mac terminal tie-up time

By David Bright

Supermac Software in Mountain View, Calif., has introduced the Superlaserspool utility for quickly returning control of an Apple Computer, Inc. Macintosh system to the user after information is sent to a printer.

"Users want to minimize the time they spend waiting for their printers," said Supermac General Manager John Duhring. "Unfortunately, the Laserwriter can take three minutes or more to print a new page, and if someone else on the network is printing when you want to, you have to wait until it's free. This shortcoming has become the weak link in the whole system."

After a six-page spreadsheet docu-

ment is sent to a printer, Superlaserspool returns control of the Macintosh to the user in 10 seconds.

According to the company, the new spooler achieves its speed via an intelligent background processing program that manages the entire printing process.

The spooler also includes a feature that allows spooled files to be printed out at any time and an accessory for showing print file status and providing help.

Single-user copies of the program cost \$149.95; the multiuser version is priced at \$395.

In other Macintosh news, Meta Software in Cambridge, Mass., plans to introduce at the Macworld Expo

this week a module that extends the functionality of its design graphics and text processor.

With Design+DA, users can write Macintosh desk accessories that directly interact with Design. Design is used for describing complicated ideas in forms such as flow charts, organizational charts or information networks.

Assembly and C language interfaces and instructions on how to generate interfaces for other languages are also included in the \$1,000 package. An updated version of Design with features such as user-controllable palettes, object layering and extended hypertext search capabilities will be available for \$200.

Macro mania

From page 37

logic control commands.

The effect of these is to create what amounts to a powerful programming language.

Lotus's 1-2-3's macro facility makes it easy to automate frequently used commands, enter commonly used label sequences and simplify complex or repetitive procedures using long command sequences.

It also can be useful in customizing a work sheet for use by someone who is not familiar with 1-2-3.

The macro facility in 1-2-3 is one of its most valued features for experienced users.

Most users, however, make little or no use of Lotus macros. Learning to use the macro facility is a bit more complicated than learning basic work sheet operations.

Macropac's 101 Macros is exactly what its name implies. It is a collection of 101 prewritten macros that are of general use. With 101 macros, users of 1-2-3 or compatible programs like Paperback Software International, Inc.'s VP Planner or Lifetree Software, Inc.'s Words and Figures who have not yet learned the macro facility gain the advantage of some useful macros.

Best of all, however, 101 Macros for 1-2-3 also provides an excellent introduction and tutorial on the use of macros. A nicely written manual includes an introduction to macros, what they are and how they are created. The macros themselves provide examples ranging from simple to complex.

Macropac's 101 Macros also offers considerable utility and significant value for its price.

It will be a welcome addition to the software library of Lotus 1-2-3 work sheet users. Its greatest value may ultimately be enabling less experienced users to learn to use their own macros.

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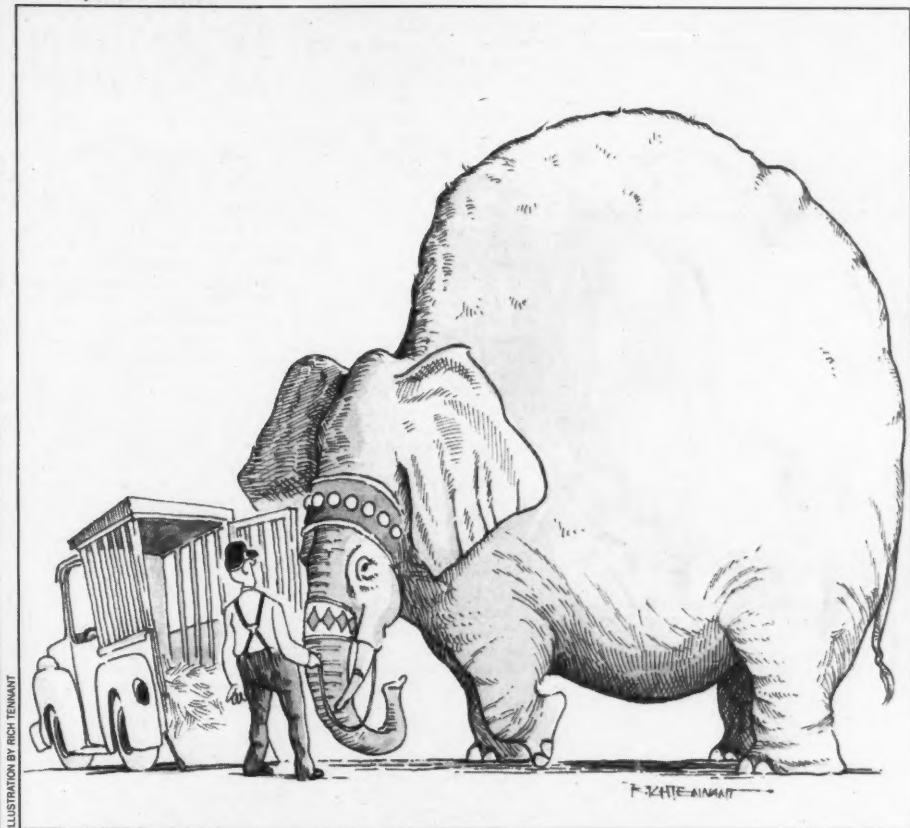
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INSIDE

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The challenge of tracking network capacity/52

Capacity planning

Senior management is finally paying attention

By MICHAEL SULLIVAN-TRAINOR

Before capacity planning became a permanent part of the DP department at Reader's Digest Association, Inc., the company often ran the risk of not being able to obtain the processor it needed in time to avoid capacity shortages.

On many occasions, because the needed computer was not available, the data center had to spread out the load among available processors by having users work overtime and on weekends. The expense of this stopgap measure soon caused company executives to establish a long-term capacity planning program.

"Everybody was dissatisfied — from the top, down," says Paul Zimmermann, the company's manager of capacity planning.

While Reader's Digest changed its approach to capacity planning about five years ago, executives at other companies are only now deciding it is time for a permanent planning effort.

For example, Coldwell Banker Co. in Laguna Hills, Calif., recently hired capacity planning troubleshooter Jason Shane to establish a program from the ground up. Shane was hired four months

ago, fresh from developing a capacity planning program for the Auto Club of Southern California.

The fact that these companies chose to develop a permanent program rather than a quick-fix solution is evidence of the change that is taking place in capacity planning.

Once viewed as an isolated technical function to be engaged in only when absolutely necessary, capacity planning is now being seen as a permanent part of MIS strategy.

Capacity planning is also becoming important to managers of departmental systems. By and large, the focus has been on IBM host-based environments, but distributed processing and relational data base systems are broadening the responsibilities of the planners.

Managers of Digital Equipment Corp. VAX and Microsoft Corp. MS-DOS systems are finding they need to become involved in capacity planning as well.

As a result of these trends, planners are being required to work more closely with non-MIS departments of the corporation to provide the vital link between the computer systems and the business strategy the systems support.

This is not an easy transition for planners who

New software is changing the way capacity planning is done. It allows planners to focus more on business strategy, rather than on analyzing data strictly on a technical level.

Sullivan-Trainor is a Computerworld senior writer.

Paying attention to capacity planning

Continued from previous page

have been raised in a technical world and who, until recently, have not had adequate software at their disposal to accurately analyze capacity problems. But now, new technologies, including expert systems, allow planners to more accurately track resource problems and respond to management directives quickly.

"New software systems are allowing old capacity planning functions to be done more efficiently. The overall function has changed drastically. Planners are getting more involved with the business side, rather than analyzing data strictly on a technical level," says George Febish, sales and marketing manager of International Systems Services Corp. (ISS), a New York-based capacity planning consulting and software company.

"They're still doing that, analyzing data on a technical level," Febish contends, "but it is not taking 100% of their time anymore. Now they can look at which business units are driving the increased resource usage."

Boole & Babbage, Inc.'s direct access storage device (DASD) performance management expert system released in December; ISS's modeling expert system, which was recently enhanced by the addition of a network module; expert system tools by VM Software, Inc. and by other hardware monitor and network management vendors are all signs of the trend toward making capacity planning and performance management products easier to use.

In addition, well-established products from Boole & Babbage, BGS Systems, Inc., Candle Corp. and Morino Associates, Inc. are also allowing planners to move away from the technical demands of their profession and devote more time to analysis.

More releases in the expert systems, networking and VM areas are expected to come from these vendors this year.

Also, large vendors such as Uccel Corp. and Computer Associates International, Inc. are offering comprehensive data center management products, such as Uccel's Synova series and Computer Associates' CA-Unicenter.

Capacity planning and performance management are encompassed by these packages, merging the planner's responsibilities with the rest of the data center.

The desire of senior management to establish an effective in-house capacity planning effort has been hampered by a shortage of qualified personnel.

Providing the kind of analysis that allows a company to determine which applications are likely to consume the most CPU time has in the past been a job for a highly skilled professional, whose background included mathematics theory, as well as systems engineering.

Because of a shortage of these kinds of technical professionals, managers are instead implementing ven-

dor packages. The continued development of capacity planning software is allowing less-skilled professionals to accomplish the analysis and forecasting functions.

"A few years ago, we had various kinds of analytical models that took someone of a highly educated background to understand," Coldwell Banker's Shane says.

"It almost required a Ph.D.-level person who knew queuing theory.

There are simply not that many people in the world that are practitioners in our field that have that kind of background."

One of the newer products that addresses this situation is ISS Three, marketed by ISS, one of the first expert systems for capacity planning. Released in December 1985, ISS Three is the combination of an expert system front end and a modeling package.

"It includes high-level screens so that users who do not have technical experience don't have to adjust numbers that they don't know anything about," ISS's Febish says. "A novice can run it and get reasonable results, while at the same time experts can change any of the fields that they want."

The system recommends changes to both performance parameters and hardware to solve response time problems. ISS Two, an expert system in change and problem management, is also being developed by ISS for release late this year.

Transforming capacity planning from a technical function to a liaison between the technical group and the business elements is requiring a new attitude within MIS, as well as within the corporation as a whole, according to H. Pat Artis, who is a capacity planning consultant and also president of the Computer Measurement Group, Inc., the national society for capacity management professionals.

"The one ace that MIS

has always had in its pocket is the user community," Artis says. "It's been possible to use that as leverage because as soon as the users get lousy service, they start complaining. But with effective capacity planning you never inconvenience the user, and you don't use the users' dissatisfaction as a foil to carry your needs," Artis says.

Allowing user concerns to determine equipment policies often results in a haphazard approach to systems planning. This approach places management in the position of purchasing whatever the vendor of a particular system recommends, because the need is at a crisis point.

Budget limitations and increased scrutiny of MIS by senior executives are making the traditional method of justifying new purchases with user anguish less acceptable.

"If nobody had a budget problem, there wouldn't be as much improvement in computer performance as

Continued on page 43

COMMON CAPACITY PLANNING MISTAKES



Treating capacity planning as a special study. Often a company has a staff member develop a capacity plan as a justification for a new processor. As a result, there is no way the staff member can say a new computer is not needed because his assignment is to justify the purchase. Also, the plan is ignored after the purchase, and there is no consistency between planning efforts.



Making unrealistic assignments of useful life to minimize current day costs. Probably one out of every 10 shops has some piece of equipment over in a corner wrapped in plastic waiting for the lease to expire. It is there because it is cheaper not to maintain it than to return it and pay the outstanding balance. Capacity planning can predict the realistic useful life of a system and prevent wasting a company's investment.



Perceiving capacity planning as a totally technical problem and not a communication problem within the organization. Many people are surrounded by capacity planning data, but because they can't present it in a way management finds easy to understand, it is useless. By looking at how to market the information to decision makers, planners can be more effective.



Failing to understand the underlying business and interact with the user community. Planners send out forms that say: "How many CPU hours are you going to use next month?" Most of the time, the people who send the forms can't answer that question for their own operations. To make the connection between business plans and resource usage, planners have to understand the nature of the business.



Not becoming part of the budget cycle. Often planners ignore the company budget cycle, even though their plan will not be effective unless it is coordinated with the availability of funds to invest in an additional processor when necessary. Overlooking this issue may result in a serious setback to capacity planning efforts.



Acquiring more capacity planning tools than the company needs. Some planners become fascinated with the sophisticated technology at their disposal, but these tools amount to expensive toys when they are not needed to create an effective capacity plan to meet the company's long-term goals.

CW Chart

Market survey: Vendors battle for leadership

By LARRY STEVENS

Intense competition and rapid growth among software vendors are giving users plenty of choices in the capacity management market.

But the complexity of the field and the tendency of vendors to exploit even the smallest market niches make it hard to find a comprehensive group of products that meet all a company's needs.

However, current technology and market trends may quickly change this situation. Expert systems together with a strategy implemented by some of the major vendors that offers a single data center management solution are combining to integrate capacity management functions.

In addition, the largest companies are consolidating, and they are bent on acquisition strategies that place more and more products within a single vendor's control.

As the fastest growing segment of the data center management software market, capacity management software garnered \$228 million in revenue in 1986, up 18% from the year before. Revenue is expected to rise to \$484 million in 1990, according to a recent report by International Data Corp. (IDC), a Framingham, Mass.-based consulting firm.

According to the IDC report, the following trends will continue to fuel the growth of the market:

- As users implement relational data base systems for both production and end-user work loads, host systems will be placed under tremendous stress.

- System optimization and work load forecasting will be essential to coping with performance bottlenecks.

- Distributed processing is also expected to increase the demand for capacity management products, particularly in the network management area, where some of the vendors have already developed niches.

- Changes in the IBM environment, such as the recent introduction of the IBM 9370 as well as the popularity of Digital Equipment Corp.'s VAX processors, are creating additional opportunities for many capacity management vendors.

The largest of more than 150 vendors in the market fall into three general categories: full-line vendors, capacity management specialists and niche vendors.

Computer Associates International, Inc., based in Garden City, N.Y., is the leader among full-line vendors, with estimated revenue totaling \$81.9 million. Dallas-based Uccel Corp. is the next largest company in this category and moving up quickly with an estimated \$60.1 million in revenue. Both companies, which have grown largely through the acquisition of other vendors and their product lines, are not

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primarily capacity management vendors, but they do offer comprehensive data center management solution products, such as Computer Associates' CA-Unicenter and Uccel's Synova line.

While these two large companies battle for leadership of the data center management market — particularly in the non-VM operating systems area — VM Software, Inc., based in Vienna, Va., with \$18 million in revenue, has carved out a strong lead in the VM area. Other companies, however, are starting to move to challenge that company's products. VM Software offers VMCenter, a comprehensive data center management product.

There are numerous niche vendors whose products come under the framework of capacity management as well as data center management software. They include Duquesne Systems, Inc., based in Pittsburgh, with revenue of \$6.3 million for what IDC defines as data center management products; and Cambridge Systems Group, Inc., based in Santa Clara, Calif., with estimated revenue of \$11.7 million.

In the capacity management specialists' field, the four market leaders are BGS Systems, Inc. in Waltham, Mass.; Boole & Babbage, Inc. in Sunnyvale, Calif.; Candle Corp. in Los Angeles; and Morino Associates, Inc. in Vienna, Va. According to revenue figures collected by IDC, Candle leads this group with \$65 million, followed by Boole & Babbage with \$25.4 million, Morino Associates with \$22.7 million and BGS with \$13.3 million.

Having focused largely on research and development rather than acquisition, these companies have had rapid product releases and are expected to continue a fast pace of announcements.

IDC predicts that Boole & Babbage will be introducing more expert systems in the near future, such as the direct access storage device (DASD) package announced in December 1986, as a logical extension of its performance management products, as well as offering more products for VM. Candle is also expected to extend its line further into VM and network management and introduce expert systems to reduce the complexity of performance management.

In addition, BGS Systems will likely expand its product line and concentrate on network management, especially in the IBM environment, according to IDC. Morino is expected to add to its MVS Integrated Control System (MICS) products, particularly in the data base management area.

Current capacity management products can be broken into two major categories. First, there are the simulation and modeling packages that directly assist the planner in creating a new system and in forecasting the results of various configurations.

Second, there are the performance evaluation products. These tools measure the system's performance and provide the data that fuels the capacity planning function. Performance evaluation tools can be further separated into data management, job accounting, software

monitors and program optimizers.

Simulation and modeling packages are designed to project response time, CPU and device utilization, throughput and other factors. Most of them also allow users to ask "what-if" questions to experiment with different variables.

The oldest modeling and simulation system is Best/1 from BGS Systems, which is sold as a package with Capture, a software monitor.

International Systems Services Corp. (ISS), based in New York, has mounted a challenge to BGS Systems with its ISS Three product, a modeling package, incorporating an expert system. ISS also announced in December an integrated network support module for its product to help planners identify bottlenecks in the network as well as in the CPU.

Boole & Babbage's Capacity Management Facilities are composed of an integrated family of capacity planning and performance measurement products that are used on IBM MVS-configured data centers.

SCERT II by Performance Systems, Inc. in Rockville, Md., is a performance management tool and capacity planner that can either run on an IBM mainframe or as a stand-alone unit on the IBM Personal Computer AT. MICS from Morino Associates is an integrated system for managing MVS and MVS/XA installations.

Data management tools in this area are used to configure data bases and optimize DASD storage. Most of these tools analyze existing DASD environments either by examining the directory or monitoring DASD performance during execution of the program.

Job accounting software reads the data base statistics on computer internal operations that most operating systems maintain. The information is normally gathered primarily to charge back resources to customers, but it can also be used to provide performance reports and fuel capacity planning systems. Three of the major job accounting software packages are Capture from BGS Systems, Control/SMF from Boole & Babbage, and CA-Jars/OS-Job Accounting Systems from Computer Associates.

Software monitors perform similar functions to job accounting systems, except that they collect their data directly from the operating system rather than from a data base. Therefore, software monitors generally provide more accurate measurement data and more detailed information of the operating system.

Resolve/MVS and Resolve/CICS, both from Boole & Babbage, are leading products in this area. Another, ADR/Look from Applied Data Research, Inc. in Princeton, N.J., is a software monitor that is also a performance management and control system. Candle also has a number of real-time software monitors.

Program optimizers are used to evaluate application code to determine which sections account for the heaviest use of processing time. Three leading products are Strobe Application Tuning Product from Programart in Cambridge, Mass.; Optimization Instrumenters from Softool Corp. in Goleta, Calif.; and Scan/Cobol from Group Operations, Inc. in Washington, D.C. ■

Continued from page 42

there is today," Artis says.

"In the late '60s, early '70s, performance evaluation first became important because we were in an economic downturn.

"For the first time since the IBM 360s were introduced in the mid-'60s, people had limited money, and they had to go back and ask the question, 'Could we get more out of what we have rather than buying more?' Economics have provided the motivation to go out and use what we have better," he adds.

As a result, management is looking to the managers of performance and capacity planning for the answers. Ironically, the planners thought they were providing answers to improved performance all along. Unfortunately, they were not providing the data in a form that business executives could understand.

"Over the past several years, there has been a re-examination of why the capacity planning message isn't getting through to the top levels. For a long time, that has been perceived as a technological problem," Artis says.

"Today, more and more capacity planners are realizing that they have to be able to relate to the information systems business and the corporate priorities as a whole.

"As a result, they are seeking to write the kind of reports that, rather than being well-suited for *Scientific American*, provide a glimmer of understanding and a reasonable business case to the people who make the decisions," he says.

"It's not a compromise. We're not going to take any of the chief executives back to the shop and teach them to interpret Resource Management Facility data.

"Instead we're realizing that what they really need is business justification for their information systems organization," Artis adds.

Senior management needs to realize that an effective, long-term capacity planning effort requires a significant commitment on their part, Coldwell Banker's Shane says.

"I told the Coldwell Banker executives that it is an expensive function that requires a large investment of money and time before they'll ever see any results.

"I also insisted on meeting with the vice-president level of the company to make sure that I would have access to high-level business plans, even, at times, confidential business plans. Only if I have access to those plans can I do the forecasting that they expect of me," he says.

In addition, Shane obtained access to speak to the heads of other business units so that he could learn about their functions and future plans.

"Not all companies are structured or run in a way that capacity planning can be successful. Some companies don't have the commitment up front, or they've seen capacity fail before and there's no more credibility," he says.

Fortunately, Shane's current job involves installing a capacity planning effort in a fairly new data center where there has been little long-term experience.

To introduce his capacity plan-

ning philosophy into the company, Shane has developed a plan that will lay the groundwork for the future. The major points include the following:

- Implement a performance tracking data base, containing measurement information.
- Implement the technical capacity and performance functions, while at the same time develop the lines of communications with other departments of the business to review the business structure.
- Develop financial analysis of the cost of ownership of hardware over a five-year period.
- Synchronize the annual capacity plan with the corporate budget cycle.

Obtaining commitment from senior management for capacity planning is only half the battle. The other half is working closely with the end users. Recognizing this need, Reader's Digest has placed the goal of effective communication with end users above that of technical perfection in the development of the capacity plan.

"We would rather have a technically mediocre plan and good communication with our top users than a technically superior plan that is lost because of lack of communication. The users are the people who really make the decision. They're the ones who raise their hands at a meeting and say, 'Yeah, we need a new computer,'" Zimmermann says.

The magazine's capacity planning department is responsible for the data center budget and a charge-out system, as well as capacity planning, performance management and application tuning.

Zimmermann and his staff of five work with an IBM 3090 and a 4381. The mainframes are accessed by about 450 IBM terminals through a Systems Network Architecture (SNA) network.

Every department of the company has applications running on the mainframes, including systems for production, marketing and editorial.

A key to the capacity planning effort at the company is establishing long-term relationships with other departments.

This is done through the drafting of a revised capacity plan every six months. The plan is developed in consultation with more than 50 people throughout the company.

"We talk to people at all levels, from vice-president down to programmer. We talk to just about anybody who's willing to talk to us," Zimmermann says.

Feedback from these discussions is used to build a work load forecast that represents the views of the entire company, rather than just the planning department.

In each interview, the planning staff will present historical trends of resource usage as well as discuss budget limitations.

Since the data center operates on a charge-out basis, the other departments are especially interested in the amounts that they are paying for service.

"We build a forecast based on their business trends. We don't try to talk DP at all. We just ask about promotions and other business changes, and we come back and translate that into the appropriate

Continued on page 46



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data processing terminology, such as CPU hours," Zimmermann says.

For example, when the marketing department invested in laser printers to improve the quality of its promotional material, it saved money because less work had to be produced by outside vendors. But it also had an impact on usage.

"Even though there was no increase in the amount of business they were doing, the usage went up fairly sharply because the operation of a laser printer requires more time on the computer.

"It's been a long-term project to get everybody to understand that and accept that the laser has a lot of benefits, but there's a cost at the other end," Zimmermann says.

People within the marketing department were upset at first because they had not foreseen the effect the printers would have on computing costs.

But because a long-term relationship was already in place and because the planning department knew the business reasoning behind the purchase, the planners were eventually able to get the users to understand the reason for the increased costs.

"It's important to understand the

Snap/Shot applies simulation modeling to capacity planning

IBM offers a wide range of operations control and data management products, as well as a customized approach to capacity planning, which it calls Snap/Shot.

The Snap/Shot program allows customers to work with IBM staff members in the application of a discrete simulation model for IBM systems at IBM's Marketing Support Center in Raleigh, N.C.

The model "can represent a company's entire data processing operation from terminal input through network to processor and I/O and back," according to IBM spokesmen.

More than 2,000 customers have spent week-long sessions at the Raleigh site developing and analyzing models for their operations.

The sessions are preceded by closely coordinated planning efforts involving IBM and customer staff members.

Typical user questions are, "How soon do I need a new CPU?" "What will happen to response time if a new application is added?" or "How can I best use new technology in my network?"

In use since 1975, Snap/Shot has helped companies as diverse as the Marine Midland Bank N.A., Virginia Electric and Power Co. and Cigna Corp. to plan their data processing operations.

While some users prefer to travel to IBM to resolve capacity planning issues on a periodic basis, many others are placing their resources behind in-house efforts.

— Michael Sullivan-Trainor

”

'It's important to understand the background or the politics behind many of these decisions so that when you talk to people and they become critical of the increased charges, you can point out the savings being made in other areas.'

— Paul Zimmermann
Reader's Digest

background or the politics behind many of these decisions so that when you talk to people and they become critical of the increased charges, you can point out the savings being made in other areas.

"If you don't understand that and you can't give them a balanced idea,

people think that costs are going up for no reason," he says.

In another example, which took place about three years ago, the data center at Reader's Digest was planning an upgrade from an IBM 3081 to a 3090. Zimmermann's department had forecast the need for a new pro-

cessor for at least two years, but when the time came to make the purchase, the company decided it could not afford to spend the money.

Because the capacity planning effort was in place, the company was able to hold off making an upgrade for a year.

On the technical side, the planners used an application tuning package called Strobe, made by Programart in Cambridge, Mass., to discover inefficiencies in the IBM CICS system code.

The problem was that a number of the housekeeping chores were being repeated unnecessarily. On the end-user side, because the planners had given them advanced warning, the user departments were able to work together to rearrange systems usage

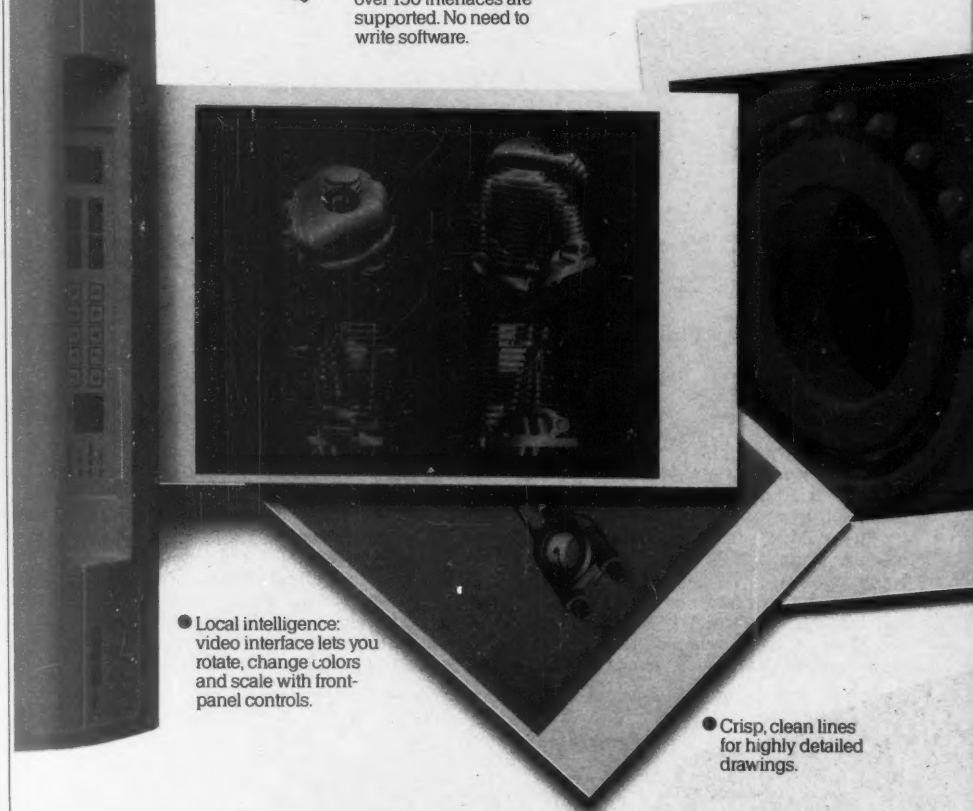
Continued on page 50

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Reconfiguration proves a thrifty alternative to buying

Capacity planning saved Combined International Corp., a Chicago-based holding company, from investing \$9 million in an IBM 3090 that it really didn't need.

In fact, the effort was so successful that the corporation may skip purchasing any of the 3090 series processors and await the next generation of mainframes, according to Paul Keller, manager of capacity planning for the past year.

"Before the capacity planning work was initiated, management worked on the gut feeling that they would run out of capacity by the end of 1986," Keller says. "With doing

some reconfiguring and moving of work loads, which we determined by finding out who is using what, we were able to see that it was too early to purchase a 3090."

One of the major difficulties in making accurate assessments of Combined International's systems needs is the size of the corporation. Combined International is made up of five independent companies that offer six major insurance product lines. Each company has applications running on IBM CICS on two 3084s and an IBM 3081.

The processors are housed in three data centers. The western center, located in Chicago, has a 3084

Model Q and a 3081 Model K. An eastern center, near Philadelphia, has a 3084 Model Q and two 3033s. A newly acquired data center, also in the East, has a 3081 Model GX.

Although Keller's group uses a number of capacity planning and performance management packages, it cannot obtain the answers management needs without the aid of homegrown applications and conceptual techniques independent of the analysis or modeling software.

"We're running six regions of CICS. If you look at the way the vendor packages allow you to build work loads, they are really based on performance group breakdown," Kel-

ler says. "Management's questions are always, 'What is this company doing?' " Keller claims, "and I can't really get to that information unless I restructure the whole operating system and say that one particular company has to work in this set of CICS regions and another has to work in different regions."

To solve this problem, Keller runs a separate set of processes that takes all of the data from the operating system or CICS and breaks it down. The system then assigns the data to the different user departments, which can then be combined to represent the particular companies.

"It allows me to see transaction volumes, consumption and I/O usage for the different departments, not in a chargeback way, but in a realistic utilization way," Keller says.

These processes are divided into three groups. One is the homegrown application that the planners developed using SAS, a statistical analysis package from SAS Institute, Inc. The system works off the System Management Facility data and the CICS monitoring data, breaking it down to represent the business units using the system.

Another is based on ISS Three, an expert system made by International Systems Services Corp. (ISS) in New York. The package allows peak periods of utilization to be isolated, allowing planners to get some feel for what is going on during peak periods and how many hours during the day in which peak conditions exist.

The third uses Capture MVS, made by BGS Systems, Inc. in Waltham, Mass., to distribute a month's worth of data into a form that represents usage based on each application.

Each process provides Keller with a different look at what is happening within the operating system and applications. But even the expert system does not provide the data in the appropriate form.

"I have to make some kind of conversion in my head to go from one set of processing to what I'm able to do in ISS Three, because all the package can come back with is production CICS as a work load. There's no real way for me to tell if it's one company doing it or another company," Keller says.

Another matter that the packages do not address is the differences between day and night work loads. "We have two distinct work loads: daytime, in which you size the machine in one way, and then we have this tremendous night work load, in which you size the machine and the peripherals in another way. I haven't found anything out there that lets me do both of those. I can look at both, but I can't understand the problems of relating one to the other," Keller says.

While struggling with the deficiencies of software packages, Keller must also find ways to respond to requests from senior management.

"I have so much data," Keller says, "that upper management can't absorb it quickly enough to understand it. I keep trying to keep my report on capacity down to a few pages. But I can't get under 100."

— Michael Sullivan-Trainor

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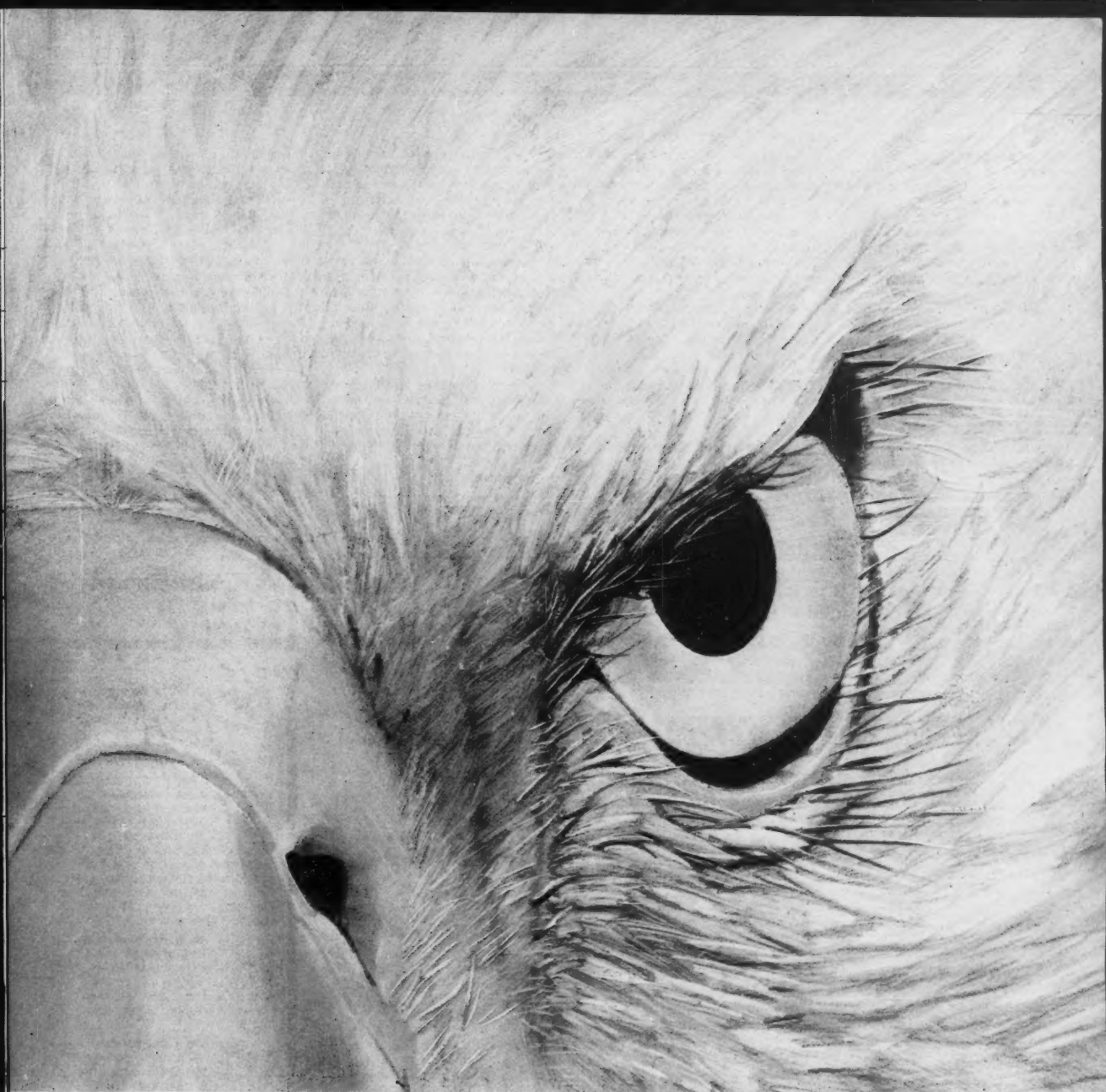
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we're now calling prey."*

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by taking some applications off the processor and trimming back the work load on others.

Things have not always gone so smoothly. Before the capacity planning department was formed, the function was implemented only when a crisis approached.

"At that time when we started to run out of capacity, someone would be assigned to do the plan, which was really just a justification for a new machine," Zimmermann says.

End-user contact was limited prior to the formation of the department. Planners typically met the users only when they were looking to justify a new machine.

Because this did not happen often, contact between the two groups was rare.

This type of relationship, Zimmermann says, is a poor one because each time a planner came into contact with a user, the planner was typically looking for money.

In the Reader's Digest's current environment, Zimmermann says, "only once have we looked for a new machine, and everybody knew about it in advance."

According to Zimmermann, when the actual proposal went forward, he heard no arguments.

"In the past, it was a screaming match until you got to the point where they agreed you needed a machine," he says.

Even when all the pieces are there — an ability to deal with senior management on business

terms, effective communication with the end users and the technology to provide accurate performance and forecasting data — managing all of these aspects to form a comprehensive capacity planning effort can still be difficult.

For instance, Kermit Doelling, manager of computer performance at McDonnell Douglas Aerospace Information Services Co. in St. Louis, has his hands full matching management's budget limitations with the end users' expectations for computer resources.

"There's a broad disparity between our customer requirements and the limitations on the financial side. We can't afford to do everything the customer wants to do," Doelling says.

The current difficulty at the St.

Louis data center has been caused by some rapid growth spurts in the office automation environment.

"It's proven very difficult to justify the investments we've made in office automation," he says.

The data center is responsible for supplying shared processors, while the end-user or customer departments purchase their own terminals, personal computers or departmental computers that they can run on their own or tie into the shared mainframes.

The St. Louis data center currently has two IBM 3084s running MVS-based work loads, two 3090 Model 180s — one running MVS and serving as a global processor and the other running VMXA supporting work loads in MVS — as well as a 3090 Model 200, running VM and carrying primarily office automation applications.

Currently, the problem rests with end-user access to IBM's Professional

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— An analysis of work schedule patterns should be conducted for various work loads and subsystems to the computing configuration.



Work load forecasting — An accurate forecast requires a combination of business forecasts, installation work load history, statistical analysis and common sense. Communication between the computer installation and business community is vital to the success of this process.

— Achieving a reasonable model presenting an accurate picture of current and proposed configurations requires a high level of expertise. Data collected from previous processes should be applied to the modeling system.



Simulation, modeling

— The entire capacity planning process is meaningless unless the results are communicated to the technical staff, the vendors and senior management in terms that they can understand.



Reporting and presentation

— Viewed as an audit check on a planner's ability to predict the future, the final phase involves an ongoing comparison of actual capacity information and projected forecasts.



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Network management: Keeping supply in line with demand

By JOSH BRACKETT

At 7:30 a.m. on Monday, Oct. 27, 1986, the London Stock Exchange's new Stock Exchange Automated Quotations system was up and running. By 8:30, it was down, its communications network overwhelmed by inquiries.

The crash of the network, which dampened some of the enthusiasm for the automation of the stock exchange or the Big Bang, is a dramatic example of what can happen when users demand more service from a network than it can supply.

Ordinarily the consequences of poor network capacity planning—or no planning at all—are less spectacular, but they can be just as serious.

At the very least, slow response means lost productivity. Under a departmental chargeback scheme, users often have the right to pay less for poor service.

If users are customers, patrons of automated teller machines at bank branches or purchasing agents with terminals on their desks that are tied into a vendor's order entry system, they may get tired of waiting and go elsewhere. If a financial network is slow, the institution using it may miss out on a deal worth millions.

Although a network and its host mainframe are physically distinct, to the user they are one system. While the problem of host capacity planning is by no means trivial, network capacity planning is more difficult for several reasons.

According to Alan Sarasohn, vice-president of network systems at BGS Systems, Inc. in Waltham, Mass., a developer of network capacity planning software, one reason for the difficulty is lack of expertise: There are just not that many people around who have network management experience. Another is corporate politics.

Often, a network and its host mainframe are managed by different people, sometimes even in different buildings. Good capacity planning requires integration.

"Otherwise you may plan a very cost-effective, very well-performing host system, but if you can't get the network work done, you've neglected to meet the end users' needs," Sarasohn says.

Furthermore, network capacity planners have to plan in an environment that is changing rapidly and often unpredictably.

For example, Chris Schuttger, a technical planner for Texas Utilities Co., which supplies electric power to 10 million customers, provides support for customer service representatives and corporate staff using 5,000 terminals located all across Texas. The terminals are connected to seven front-end processors, which in turn are linked to three IBM 3090 mainframes.

"The problem is not just the current network plus the growth of current traffic on already existing terminals," Schuttger says. "It's also those new departments that are continually coming on; it's putting more

cities on the network, increasing the line speeds to major locations and trunk lines and how that affects our front end and backup into the host."

Not only do user firms want to do more with their equipment to reduce costs, increase productivity and gain a competitive edge, but IBM has also been a constant source of change in both hardware and software and will continue to be as far into the future as any one can see.

"The trouble is," says Tom McDonald, a consultant who specializes in IBM Systems Network Architecture (SNA) performance manage-

ment and capacity planning, "just when MIS and data processing managers are coming to understand network management and products are being developed to deal with this issue, IBM is changing the rules by continually unveiling new network strategies. IBM is rewriting the way that SNA does business."

In particular, McDonald cites IBM's new Advanced Peer-to-Peer Communication (APPC), especially when used with Advanced Peer-to-Peer Networking (APPN).

"Before, whenever I wanted to talk to anyone on an SNA network, I had to establish a conversation with a mainframe computer. Now, with

this new approach, I'm allowed to talk to people connected to the same minicomputer or another minicomputer or another personal computer, without having to go through a mainframe. It's great, but we've just barely gotten a handle on managing the larger network."

Tom Parker, a senior technical specialist at the Bank of Boston Corp., works with two 3090s, each at a separate data center, and a network of approximately 90 lines going out to 40 branches, each with its own branch staff terminals and ATMs. The bank has been growing quickly recently, opening up new branches and taking over smaller banks, all of

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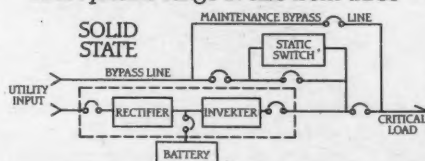
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Brackett is a free-lance writer who lives in Rockport, Mass.

Executive Report/Capacity Planning

which have to be added to the network.

Parker has been modeling network capacity using Best/1-SNA, a software package developed for the purpose by BGS Systems. Until he started doing that, Parker recalls, "most of it was just by gut feel. When I came into this — I used to be an operator — there wasn't really anything done in network planning. It's still a new field. They really had no idea what was going on in the lines. As long as the people didn't complain, the response time was acceptable."

According to Jeffrey P. Buzen of BGS Systems, a mathematician who has developed much of the queuing theory that is the basis of BGS's network modeling software, network capacity planning based on intuition

and experience is often wrong. Not only is relevant experience scarce, but network behavior can be startlingly counterintuitive. For example, even in simple systems, as utilization approaches 100% of capacity, response time increases not linearly but exponentially.

"Corporate management thinks the network is like this big parking lot," McDonald says. "If you run out of parking spaces, no problem. We'll just bring in the hot top, roll out some more tar and paint some more spaces. The way the network really functions is when you're three-quarters full, you don't really have a quarter left. These things do not degrade gracefully. They go right down the tubes. Although upper management is evolving in the way they think about things, they still don't

have a good understanding."

According to Sarashon, some companies try to avoid planning by overspending. "They say, 'We don't do that function; we just buy more than we need' — which is kind of a contradiction because if you haven't analyzed it, you don't know how much you need. So how can you buy more?"

Sometimes you need less capacity than you think. Network planners at Centel Corp., a small telephone company headquartered in Lincoln, Neb., noticed that because of changes in business activity, data traffic had meandered away from some of its multiprod lines toward others, threatening to degrade service at the busier clusters.

One solution would have been to buy more lines and modems. By modeling the network using Best/1-SNA, though, Centel found that it could achieve the same result simply by changing the network control program's service order table, making the front-end processor poll the less busy clusters less frequently and favor the busier ones.

Jerry Vidlak, senior telecommunications analyst for Centel, says that network modeling has "helped us break the habit of dealing with problems by overreacting or making arbitrary changes to our system."

According to Parker, although modeling the network using the Best/1-SNA system is much better than seat-of-the-pants or trial-and-error methods, it is not the final answer. The Bank of Boston is not yet involved in APCC, but there are things going on out in the branches that affect response time at terminals that cannot be measured from the host.

"We only see as far as the control unit and back," Parker says. "We don't see what goes on in the control unit and out to the terminals. The only thing we could do, which we did, is go out there with a stopwatch and measure what was going on. There's a place in Best/1, a blank field, where you can put that measured response time into the model."

Parker would also like help with "the geographic setup, the topological optimization of the lines. There's

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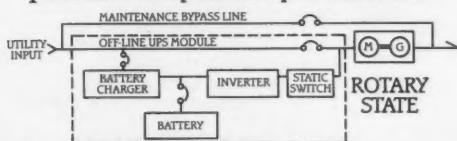
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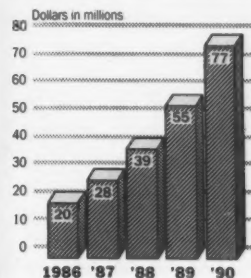
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no way with Best/1 to figure that. If I have a line out there or a network where the lines are overutilized, there's no way that I can go out with the BGS product and say, 'What's the best way to configure this network?' " Parker says.

Difficulties in accumulating the data needed to do good network capacity planning is a common problem. Sarashon says, "The information is there in multiple files across multiple data centers in the large shops. The person who would use our products may not be the person who has ready access to that data. It's mostly a political problem."

"Ten years ago people used to say the same things about mainframes — 'Gee the measurement data is all over the place!' — but the industry overcame them. And the industry is beginning to overcome them in the network area as well."

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Continued from page 50

Office System (Profs), which is being utilized by about 1,100 logged-on users.

"It's getting pretty close to the limit. IBM has advised us not to depend on pushing that number beyond 1,200 in our environment without potentially exposing ourselves to system outages," Doelling says.

If the data center had the money, the problem could be solved with the purchase of another processor.

But because management has said that the money is not available, Doelling says he is attempting to control Profs usage.

As a first step, the data center staff has restricted its hours of use of the system to avoid periods of peak utilization.

By using the system early in the

morning and later in the day and allowing customers to use the system during regular business hours, the staff has reduced the pressure on the system by about 200 users during peak periods.

Doelling is also using performance management software packages to bring efficiencies where possible, but

the tools that are available for the VM environment do not match the capabilities of what can be done in MVS.

For example, a product like TSO/MON by Morino Associates allows a very specific look into the TSO application, and there is nothing comparable on the VM side that would allow

"There's a broad disparity between our customer requirements and the limitations on the financial side. We can't afford to do everything the customer wants to do."

— Kermit Doelling
McDonnell Douglas Aerospace
Information Services Co.

the examination of unique functions within Profs to determine which areas are causing the most pressure on capacity.

"We've achieved a lot of tuning efficiencies, but there's not much the products can do to control the rapid growth we've been seeing," Doelling says.

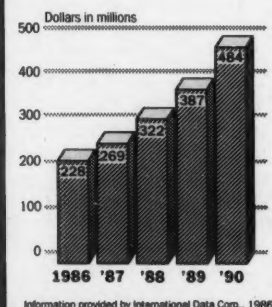
This is the third time the Profs/VM system has required an upgrade. Since January 1985, the load has been passed to increasingly larger processors, from an IBM 3033 to a 3081 that was acquired in late 1985 and now to the 3090, which was installed in mid-1986.

Another major problem is that the end users are not aware of how the financial part of the business affects the kind of computer support MIS can provide.

"They just haven't heard the financial people telling them what the budget limits are going to be for the 1987 operating year. We're more in tune with what their upper management is saying regarding the financial constraints than they may be down at the project level," Doelling says.

Despite the need to cut back, the

CAPACITY MANAGEMENT REVENUE FORECAST



customers are consuming more resources on the Profs system than they were before the data center went to staggered hours, because of the continued growth of their departments.

So Doelling's department is in the position of holding off the flood until another processor can be purchased, but until then there's not much that can be done.

The major step this year will be distributing what limited capacity there is among the needs of the growing departments.

"Someone will have to sit down and prioritize these projects," Doelling says.

"They will have to look at each project based on the contribution it makes to the corporation and decide which ones get done in 1987."

To Doelling, this task, the responsibility for which rests with the customer base, will be the more difficult process to go through.

When it is done "we will be asked to size these projects and say how many of them can fit into the capacity we have," he says.

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In Depth/1986 Features Index

An index of 1986 feature articles

In Depth presented 95 stories in 1986, covering both technical and managerial topics. In the technical arena, Capers Jones wrote on programmer productivity, Bill Inmon rated DBMS performance and Stephen Gerrard discussed SQL's merits as a language. For managers, John Rockart analyzed end-user computing tactics, Gerald Weinberg disclosed the secrets of consulting, Peter Keen outlined new career paths and Alan Paller described MIS' role in PC graphics. Industry topics covered were Leonard Kleinrock on IBM vs. AT&T, Jay BloomBecker on computer crime laws and Sanford Sherizen on privacy.

Product Spotlights offered readers a buyer's guide to 17 specific product categories, including 2,400 bit/sec. modems, page printers and expert system shells. A full-length product chart accompanied each one.

Executive Reports helped readers answer the question: Is now the time for this technique or technology? Thirty-one reports covered information centers, voice/data networks, executive information systems, in-house publishing and much more.

Special issues included two *Computerworld Extras*, on DEC and IBM, plus *Computerworld's* 1,000th issue celebrating 40 years of computing.

This index is intended to help readers locate articles on particular subjects of interest from last year. To order a back issue, call or write: Back Issues Department, *Computerworld*, P.O. Box 9171, Framingham, Mass. 01701-9171 or (617) 879-0700 x371. Each issue costs \$2, prepaid by check made out to *Computerworld*. Issues published on April 21; July 7, 14; and Sept. 1, 8 are not available. For multiple reprints of individual articles, call Nancy Shannon, Rights and Permissions Manager, at (617) 879-0700 x304. Reprints are available on 8½-by-11-in. paper in quantities of 100 or more.

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In Depth

CPU history repeats itself

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RISC's impact on cost/performance goes back to the '60s • DP managers can anticipate future peaks and plateaus in CPU power

• RISC architecture:
A serious alternative?

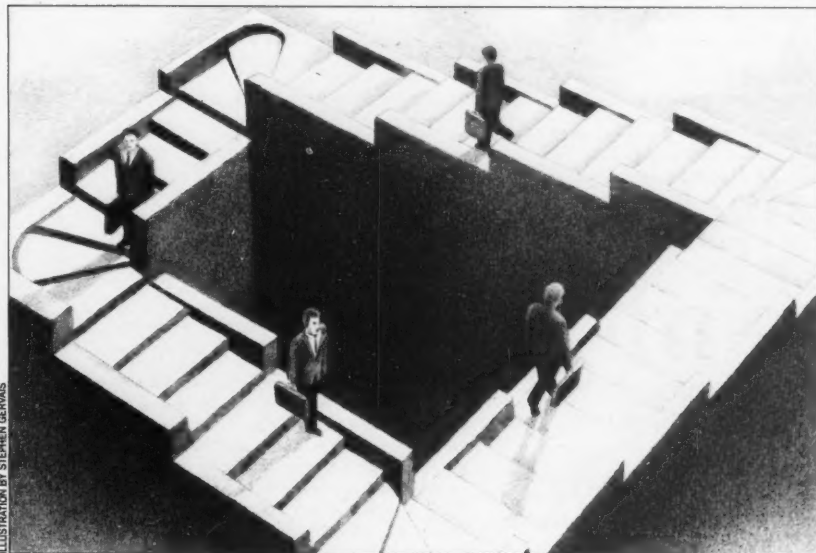


ILLUSTRATION BY STEVEN GERVAIS

By KARL REED

The architecture and organization of a computer, its instruction set and internal implementation — all are matters that data processing executives frequently prefer to ignore. To these executives, the most important factor in design consideration is compatibility: A computer is either clearly compatible with an existing collection of software or it is not. The next most important factor is cost per unit of performance. Any factor beyond these, even ease of use, tends to pale in significance.

Yet a small number of computer manufacturers have spent considerable effort pursuing an incompatible architecture — the reduced instruction set computer (RISC). IBM has been designing RISCs since 1975, when John Cocke and George Radin began the 801 project, which is believed to have yielded the RT Personal Computer, a high-performance RISC-based workstation. Pyramid Technology Corp. claims to have a RISC machine, and several Silicon Valley start-up companies have gone in the RISC direction rather than utilize the Motorola, Inc. M68000.

Hewlett-Packard Co.'s recently announced RISC-based Spectrum series utilizes programmer-accessible caches, which, while not a RISC concept, may lead to some interesting low-level programming.

The problem is that any supplier adopting the RISC approach guarantees that programs already running on existing product

lines will have to be recompiled.

Most DP managers tend to react badly to such a prospect. Why then would an existing supplier choose such a product development path?

By exploring the history of the RISC concept, its advantages and disadvantages, we believe the reason will become clear.

Why RISC?

The RISC concept, in its modern form, is the result of a conscious attempt to exploit a particular technological development — the custom-designed very large-scale integration (VLSI) chip capable of holding more than 60,000 logic elements, or gates. Theoretically, single-chip CPUs present very significant price/performance advantages by simplifying printed-circuit boards and reducing chip counts.

All new design philosophies generate their share of controversy. The major design approach from the mid-1960s to the late 1970s was to increase functional power of individual instructions, encoding complete high-level operations in single instructions.

These designs, made economical by microprogramming and cheap, high-speed medium- and large-scale integrated circuitry, have been called complex instruction set computers (CISC). Their designers and manufacturers naturally question the value of the RISC concept; the RISC supporters attack the CISC concept for exactly the opposite reasons.

If a company has an extensive DP

About the author

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In Depth/RISC Debate

operation, then it will have compatibility as its main criteria when purchasing a system; if the company is about to embark upon a new phase of DP activity that invalidates previous investments, then compatibility may not be an issue. Service, ease of use and price/performance issues will predominate.

At the same time, however, computing technology is evolving, and the cost of a unit of performance decreases at 30% per annum compound. DP managers committed to a particular product line see this price/performance decline as a smooth, continuous process.

Price/performance discontinuities

Reality is different. History has shown that technological developments can yield improvements of several factors in price/perfor-

mance, although usually not from one manufacturer and almost never from a single product line. DP managers, the people with acquisition responsibility, must be able to predict or anticipate price/performance shifts and discontinuities and exploit these to their organizations' economic advantage.

One of the most important discontinuities in price/performance occurred when minicomputer design principles were applied to the implementation of so-called mainframe computers. The characteristics of a minicomputer were small words (12 to 16 bits), modular I/O (I/O facilities were not integrated into the mini's CPU in the same manner as for mainframes), simple bus architec-

ture and a limited instruction set. By the time the Digital Equipment Corp. PDP-11 appeared, design philosophies were clearly more important to cost per unit of performance than was small word size. The result of this was the DEC 2020, a low-priced, 36-bit word version of the DEC PDP-10 mainframe. This was followed by the DEC VAX-11/780, the first of the so-called superminis — minicomputers with genuine mainframe performance. DP managers who anticipated these changes were able to achieve savings for their companies. Those who could not had to wait.

Early trends in computer design

The first digital computer designers took typical computational processes and asked the question, "What is the simplest way of performing the operations?"

For example, $A = 125 + 126 + 5 + 3$ could be handled in two different ways. One way was to write the computations down in columnar form and add each digit position together, taking care of any carrying.

An alternative approach was to add the first two numbers and add the next to that result, accumulating the sum until no more numbers are present.

Mechanical calculating machines already worked this way, and the early computer designers in the late 1940s found they could build electronic devices that would emulate this model. Programs for these computers were built of instructions that combined the value of an operand with an accumulator, putting the result in that accumulator. Very few instructions were provided.

Designers' experience with computing was limited; concepts such as subroutines or procedures had not been invented in 1948, nor had virtual memory, I/O channels and complex addressing modes to simplify access to data. The first computers were genuinely reduced instruction set computers — no one knew any better.

Experience in programming and problem solving accumulated quickly, however, and designers sought to improve machine performance in a number of different ways. Instruction speed could be improved by using faster basic components, but this approach is always limited by currently available technology.

Speed could also be improved by introducing a wider range of instructions, particularly by introducing single instructions that can replace a frequently used sequence of instructions. Designers found that these sequences could be implemented to execute in the same amount of time as single instructions.

CPU designers did not stop at that point. By the mid-1950s, it had become clear that computing speed could not be improved easily because basic component technology was advancing slowly. Improvements in performance could be achieved easily only by seeking even larger instruction sequences to convert into single instructions.

An excellent example of this trend was the introduction of floating-point arithmetic hardware. Floating-point operations enable scientific calculations to be performed; they require a fairly lengthy sequence of instructions. They also contain operations that can be performed simultaneously in hardware but must be

"

Time and space in computers are interchangeable to some extent. One could use more logic — take up more space — to achieve a particular result in a shorter time. But the design complexity would increase significantly, and you would reduce your chances of fitting a complete CPU onto one chip.

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Methods of speeding up a computer

Method	Comments	Effect on Hardware Volume
Use faster components	Limited by available components; definitely bound	Not increased
Use more complex instructions	Very promising if commonly executed sequences can be found; saves instruction fetches and increases speed	Will be increased depending on the instructions and design approach; hardware complexity also increases but not excessively
Use "overlapping" complex instructions with existing instruction sequences	Maximum speed gain; a complex instruction may appear to take only one instruction-fetch-and-operate cycle	Significantly increases hardware complexity by amount depending on the extent of the overlap sought

CW chart

Since the 1950s, hardware engineers have sought to improve CPU performance by varying basic components, chip size and instruction sets.

performed serially in software. Floating-point hardware performs these functions roughly 200 times faster than equivalent subroutines.

Other operations were built into hardware. For example, the Control Data Corp. 3200, released in 1963, included the following as single instructions:

- Instructions to move strings of characters around.
- Instructions to search a list of characters to find a particular value.
- Instructions to search a list of words.
- Instructions to perform arithmetic on strings of binary-encoded decimal digits (BCD).
- Floating-point operations.

These operations could be performed simultaneously with the execution of other instructions if the programmer desired, while the float-

ing-point and BCD arithmetic always executed in parallel with the main instruction stream.

Performing operations in parallel with the remainder of the program is one method of obtaining speed increases without using faster circuitry (see chart at left). Machines exploiting the last two types of operations became very complex, used vast amounts of hardware and were occasionally unreliable.

The limits of CPU performance

It is important to understand that the smallest amount of functionality could be added to an existing design relatively easily. Computers were being built from single components — resistors, transistors and capacitors. Printed-circuit board technology was very primitive, and wiring technology was fairly simple, allowing what is in effect three-dimensional wiring, again allowing very complex interconnections.

Designers could not easily improve basic component speed, nor had they the knowledge of computer design necessary to improve speed. They could, however, add more components with relative ease — and they did.

The basic factor that limits the performance of a computer's central processor is the gate delay, the time it takes for a signal to travel through a logic element. The inverse of the gate delay of the fastest common logic components provides an interesting hypothetical upper limit to the speed of a CPU to be used to execute a single instruction stream.

Producing a single result each time a gate operates would seem to be a reasonable upper limit for such a CPU's performance. Achieving execution speeds that approach the switching speed for a single CPU requires vast amounts of parallelism of various kinds and is usually associated with simple instruction sets.

Language-oriented CPUs

The limitations or component speeds that were experienced by designers in the late 1950s and early 1960s, coupled with the development and widespread use of high-level languages, provided significant incentive for the development of special instruction sets capable of efficiently executing high-level languages.

Burroughs Corp. designed the B5000 and B5500 in the early 1960s with this in mind, following the development of Algol 60. The B5500 was designed to execute Algol efficiently and to support virtual memory. It had special instructions for allowing parts of Algol's complex procedure call operation to occur efficiently and had genuine stack operations as well as very sophisticated character-handling instructions.

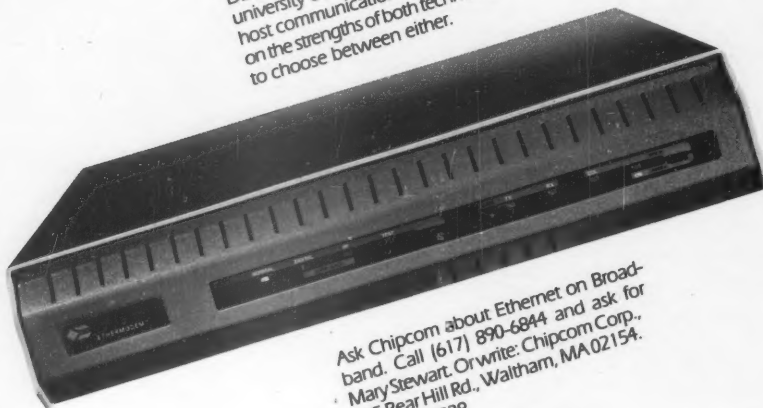
The B5500's successor, the B6700, went even further, providing a complete runtime support environment for Algol. The B6700 employed an extremely complex architecture by any standard and was difficult to speed up. However, it proved to be a very effective data processing system, partly because of its sophisticated I/O subsystems.

Language-oriented architectures — the high-level language (HLL) machine concept — attracted considerable attention in this period. The reasons for this were summarized in 1980 in a paper by D. R. Ditzel and D. A. Patterson of Bell Laboratories called "Retrospective on High-Level

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Language Computer Architecture." The reasons are as follows:

- Reduced difficulty in writing compilers.
- Reduced total systems costs.
- Reduced total software costs.
- Drastic reduction in system software.
- Reduced semantic gap between programming and machine language.
- Improved code compaction.
- Easier debugging.
- Interesting research.

Machines were built to execute Cobol, Fortran, Euler and Pascal; machines were also produced that were capable of supporting more than one high-level language — a necessity for commercial machines.

The IBM System/38 and the NCR Corp. Criterion were designed to support multiple virtual machines tailored to various languages. Burroughs designed the B1700, a microprogrammed machine, to address this issue. However, the machine was not a commercial success.

In practice, the logic complexity of the language-oriented approach and the resultant complexity of the computers produced has meant that the method has been temporarily discarded as an approach to CPU design.

Other factors, such as emphasis on sheer speed and the difficulty of achieving multiple-language environments, have also altered the economics of machine design.

But by the same token, it is too early to write off this approach. IBM, for one, is still committed to this approach; the System/38 is an example of this.

Microprogramming

Reduction in cost of a given unit of performance dominates computer design and is more important than either cost or performance. The total amount of hardware needed to implement a CPU determines the processor's manufacturing cost and, to some extent, the difficulty of its design.

Microprogramming recognizes that a computer instruction can be broken down in much the same way as a data processing procedure. The result is a set of microinstructions that can be put together to form a computer instruction. It is necessary to provide a microprogram instruction address register to control sequencing, much like an ordinary computer. The main gains are reduced component count and ease of design; the cost is reduced speed.

CPU designers did not see microprogramming as a serious option until the advent

of integrated circuits in the mid-1960s. Integrated circuits offered low-cost, medium-speed components that could have been used to increase computer speed for given CPU costs. However, designers opted for moderate increases in speed and moderate decreases in cost — the improvements in circuit speed being used to reduce component count.

Microprogramming led to the impressive price/performance reductions associated

with minicomputers and eventually to the single-chip microprocessor. Most microprogrammed machines need several microcycles — the time needed to execute a single microinstruction — to execute a single instruction using logic that, employing earlier design approaches, might have executed a single instruction in the same time.

By the late 1970s, only the fastest machines were not microprogrammed, and microcycle times of the order of

50 nsec were common on high-performance mainframes.

Most computers are capable of handling a wide variety of programming problems effectively; they do not aim to be efficient processors for a single class of problem.

Universal instruction set

The approach taken in designing these computers is to regard instructions as primitive building blocks that can be put together to achieve

various functions.

Designers became rather good at this by the mid-1960s, and some machines — for example the PDP-10 — proved to have well-chosen instructions in the sense that quite complex operations could be formed from a few instructions.

Attempts were made to include some frequently used operations as single instructions, but the HLL approach did not prevail. Instead, an intermediate level of instruc-



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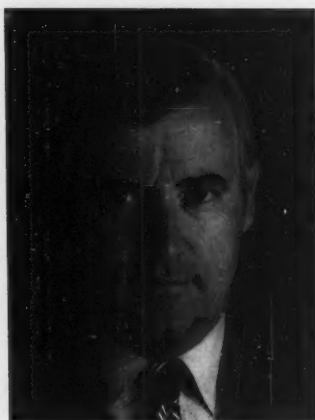
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tion functionality, which we now call complex instruction sets, succeeded. These could be implemented in a few microcycles.

So, we identify a hierarchy of instructions, varying from the ultra-complex, HLL-oriented machines such as on the Burroughs B6700, to the very complex, such as those on the VAX-11/780, to the complex IBM 370.

Enter the RISC

In the evolution of instruction set design, complexity gradually increased as time went by. At the same time, a third design philosophy gradually arose as an alternative to the HLL and CISC approaches. It seems to have begun with the CDC 6600, designed by Seymour Cray.

The 6600 was a complex machine in terms of its implementation but very primitive in terms of its architecture and instruction set. The fastest machine available for many years, it was a bare-bones machine in which the programmer was, in some senses, given access to basic machine components.

The machine's instruction set was fairly simple by the standards of the day. Few instructions could trigger more than one arithmetic operation at a time when most CPU designs allowed for at least two — one an operand arithmetic, and the other to support indexed addressing. There were no operations between memory and registers; it was possible to move data between memory and registers by writing an address to an appropriate register.

A similar design approach was taken with the early minicomputers. The designers relied upon the raw speed of the computer to compensate for the need for powerful instructions.

Integration and the single chip

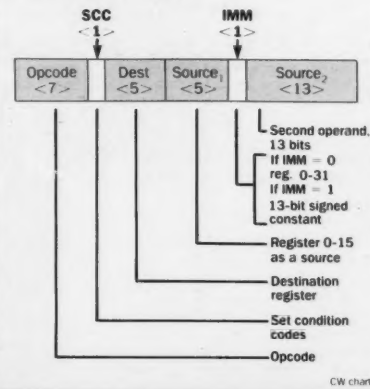
While computer designers pressed ahead with their various approaches, the pressure of technology was increasing. The development of integrated circuits proceeded rapidly, and in the early 1970s, the first single-chip computer appeared.

The design philosophies used in the single-chip microprocessors, however, had little impact on the mainstream of CPU design until they had moved from the 8-bit microprocessor to the 16-bit to the single-chip 32-bit computer. Mainframe CPU designers were forced to reconsider their approaches by the time the Motorola 68020, a full 32-bit CPU, appeared on a single chip.

VLSI circuit techniques had allowed around 20,000 to 60,000 gates to be fabricated on a single chip by the early 1980s, posing both an opportunity and a serious challenge to mainframe designers. Machines such as the 68000 rapidly overtook the large-scale minicomputers in raw performance, making a reduction in cost per unit of performance essential.

Other factors began to interest CPU designers. Compiler writing

Berkeley RISC instruction set



The Berkeley implementation of RISC is based on several tenets: Each instruction should take only one cycle to perform, all instructions should be the same size and the only memory or register transfer instructions should be loads and stores.

technology began to improve in the late 1970s and 1980s, and experimental work on a wide range of programming languages led to an improved conception of the instruction set as a building block.

Simple sets, fast machines

The microcycle became an obsessive parameter in designers' minds, and the question began to be asked: "Why not execute one high-level instruction per microcycle?"

As should be reasonably clear, time and space in computers are interchangeable to some extent. One could use more logic — take up more space — to achieve a particular result in a shorter time. However, the design complexity would increase significantly, and the possibility of fitting a complete CPU on a single chip would be reduced.

By the mid-1970s, a real counter-pressure had developed. This was backed by experimental work that led to high-performance microprogrammed CPUs of a special kind — those developed at Xerox Corp.'s Palo Alto Research Center (PARC) to support the Alto and Darado workstations. These workstations were precursors to such machines as the Apple Computer, Inc. Macintosh and the Commodore Business Machines, Inc. Amiga. The Xerox PARC machines were very fast and were designed with the object that each microinstruction could be a single instruction for a variety of high-level languages.

Finally, designers looked at Seymour Cray's machines, the CDC 6600 and 7600 and the Cray I, and the answer seemed clear: Simple instruction sets lead to faster machines.

All the pieces were now in place. What was needed was a clearer statement of concept and objectives and, above all, a champion — someone to promote the idea.

The Berkeley RISC

RISC literally burst onto the international stage during 1982, when Patterson, then a University of California at Berkeley associate professor, announced the results of a truly massive research and development project to produce a high-performance CPU on a single chip.

The design concepts for RISC I, which came out of this project, evolved from the various observations made earlier (see chart at left). The following summary is based on Patterson's and fellow Berkeley professor C. A. Sequin's papers:

- Instructions should take only one cycle. RISC I instructions should be about as fast and no more complicated than microinstructions in current machines, such as the PDP-11 or VAX. However, they should be meaningful machine instructions — microinstructions usually are not.
- All instructions should be the same size. This simplifies implementation but leads to larger programs.
- The only memory and register transfer instructions should be loads and stores.
- High-level languages should be supported not by complex instructions but by a serious attempt to recognize and provide solutions to problems common to all languages.
- The machine should be simple to design and implement.

One immediate decision was that the machine need not be microprogrammed, allowing maximum use of available logic speed and space. In addition, programs implemented on RISC I would likely be larger than those on other machines. Finally, given a reduced number of instructions, the complete CPU could fit easily on a single chip.

Members of the Berkeley team studied existing programs to identify fundamental issues to be addressed in the design of instruction sets. The results supported those obtained from other studies:

- Integer constants and array elements were accessed with roughly equal frequency.
- Eighty percent of scalar references were to local variables.
- Ninety percent of array or structure references were global.
- Procedure call/return operations were the most expensive in terms of time.

The machine developed by Patterson and his Berkeley colleagues — RISC I — runs with a 1.5 MHz clock

speed and executes one instruction in 2 msec.

The Berkeley RISC performs all instructions in a single cycle, except those referencing memory, which take two cycles. It supports 8-, 16- and 32-bit data items and has index-plus-displacement on the only address mode.

Making use of Mark I

RISC I follows the convention used in the Ferranti Mark I in 1951, followed by Seymour Cray in the CDC 6600 and in subsequent machines, of making the contents of register "zero" equal to zero.

This, coupled with the interpretation of the Source2 field and the IMM instruction fields allows a full range of address modes to be achieved from an indexed address mode.

However, all instructions do not support all address modes. Arithmetic instructions are register to register, or at $R_1 + S_2$, behaves as an immediate address mode, while appearing as an indirect address mode for memory references.

Register windows

Procedure call/return is one of the costliest actions on most computers. One reason for this is that some programming languages have complex requirements for handling local and global references, requirements that can only be met by executing a moderate number of instructions.

This situation can only be ameliorated by transferring the work associated with each nonlocal reference to the reference itself instead of attempting to build an environment at each call.

Another reason for the costliness is that special steps must be taken to ensure that parameters can be passed through from one procedure to another. This problem is alleviated by the use of caches (associative memory buffers). Parameters can be passed on a stack; if their reference pattern is suitable, they stay in the cache, accelerating access.

Caches were too complex for the Berkeley RISC team; the chip did not

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Issues of the Information Age:

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had universal telephone service.

Today, as the Information Age has begun, there is a new kind of isolation. People are awash in a mounting sea of information, yet unable to connect or work with information in an orderly, useful form; that is, with the world's knowledge. Often, information machines do little to help. They are difficult to use, rigid in their demands, generally unable to work with any but their own kind.

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capable, they will bend to the will of human beings, rather than forcing humans to bend to theirs.

Obviously, no one company, no one nation, can universalize the Information Age. It will take the best minds of many companies and many nations. The needs of our customers are creating imperatives for our industry. We need common standards and compatibility. We need national and international policies that are open and encouraging. And we need to make information machines far easier to use.

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Telecommunity is our goal. Technology is our means.SM

We're committed to leading the way.



In Depth/RISC Debate

contain enough space for the additional components. In any case, caches are really only registers that are made to run slowly because of their associative addressing.

The Berkeley team invented an overlapping window approach to registers (see chart at right). A large number of physical registers are provided, in this case, 139. Each procedure uses 32 registers; however, these are regarded as four groups: global, low, local and high.

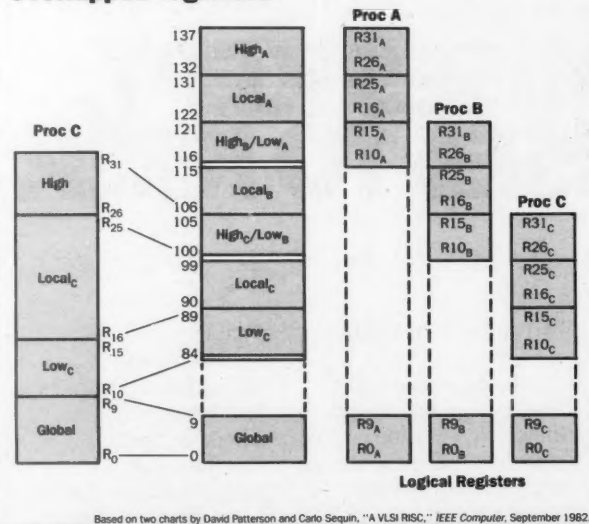
Parameters to be passed between procedures are placed in the caller's low-register window. This becomes the called procedure's high-register window so that parameters can be passed without being moved. Clearly, any parameter to be passed must be moved if it is to be passed to another called procedure, but it is moved only between registers.

While not central to the RISC concept, the register windows are a significant architectural feature of RISC I and contribute substantially to its performance by reducing memory references. However, this feature occasionally undergoes one major difficulty: All register windows will be used if the calling depth is sufficiently great. Some method must then be found for storing additional windows in memory. RISC I handles this problem by using a trap that invokes a software routine to handle the overflow.

Pipelining

Pipelining, a technique used in some RISC designs, is one of the simplest and most effective means of

Overlapped registers



Based on two charts by David Patterson and Carlo Sequin, "A VLSI RISC," IEEE Computer, September 1982.

The Berkeley version of RISC sets up registers as overlapping windows, which reduces memory references and boosts performance.

increasing machine throughput.

Pipelining occurs when the instruction execution cycle is broken into desirable phases, and logic is built to perform each phase. An instruction is executed by passing it, stage by stage, "down the pipe."

As soon as the instruction leaves

the first stage of the pipe, a new instruction enters. So if an instruction can be broken into four phases, four instructions can be executing simultaneously, and, given ideal conditions, one completed instruction from the pipe can be obtained in the time it takes to execute one phase. This yields a fourfold increase in speed if the phases can be made of roughly equal duration.

The Berkeley RISC I uses instruction prefetch, a simplified form of pipelining in which the next instruction is retrieved in parallel with the

current one's execution.

Instruction prefetch is fine unless the current instruction is a conditional jump, in which case one has no idea what the next instruction should be. Larger machines have very sophisticated and complex hardware for ensuring the correct branch is taken. Some machines prefetch both branches and begin their execution, discarding the one that was not necessary.

RISC I solutions

RISC I solves this problem by not actually performing the jump until after the execution of the prefetched instruction, that is, the one following the jump. This avoids a need for complex hardware and is simple to handle at compiler level.

A problem similar to that found with prefetch occurs with pipelining. Suppose one instruction alters the variable B, and the next instruction needs the value of B as an input. Altering B — writing the result of the operation to memory — will be the last operation in the pipe; fetching a value will be one of the first. This means that the second instruction will see the unchanged value of B, since it enters the pipe before the first alters B in memory. Again, large machines have complex logic to detect this write-back problem.

The RISC approach is simple. Let the compiler put dummy instructions between the two so that the one altering B leaves the pipe before the other enters. Considerable hardware is saved as a result.

Improvements, drawbacks

RISC I demonstrated several important points:

- It showed that simple CPUs could be reasonably powerful.
- It showed that CPU design could be simplified if some of the work is

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In Depth/RISC Debate

transferred to the compilers.

• It showed that single-chip CPUs could compete, in broad terms, with a VAX-11/780.

A number of questions were left unanswered, however, and the debate on RISC degenerated into a mudslinging match with Patterson and his supporters on one side and CISC designers on the other.

Fundamentally, however, many of the CISC brigade have developed selective blindness and ignored the fact that RISC architecture offers advantages in situations where one expects to squeeze complete CPUs onto a single chip with a limited gate count.

Interestingly enough, the point has not been lost on several commercial CPU designers, who have adopted the RISC architecture.

The RISC machines do offer one significant drawback: They require a larger volume of instructions for a given task. This means that the traffic directed to memory as a result of program execution is significantly heavier than, for example, that of a VAX-11/780. The use of the window register system, however, reduces memory traffic, and the use of caches and multiple instruction prefetch can solve the instruction traffic problem.

CISC microprocessors

CISC microprocessor design has not stood still. The Motorola 68000 has been expanded to a full 32-bit machine with 32 bits off-chip memory address and data paths. Its instruction set extends to almost twice its previous size, coprocessor capability has been added and performance has been enhanced. A complex instruction cache is included to reduce memory references, and 11 addressing modes have been added.

Internal complexity has been enlarged, however, using a two-level microcode scheme to achieve high performance from the limited amount of logic available. The resultant CPU, the 68020, is capable of very high performance but is claimed to be slower than commercial RISC machines such as the HP series.

It should be clear by now that RISC is a design approach intended to maximize the performance of a single-chip CPU by having microinstructions powerful enough to serve as real instructions. The approach constitutes recognition that there is a limit to the amount of parallelism that can be achieved easily on a single chip because of wiring constraints and component counts.

I do not regard the multiple overlapping registers as unique to RISC: They could be applied to any general-purpose register machine with useful effect. Nor do I regard a small instruction set to be a criteria central to the RISC concept. The fundamental objective is to get high performance onto a single chip.

The RISC debate

The current debate on the merits of RISC, like any technical argument with commercial implications, is riddled with misconceptions and badly presented cases. RISC designers — particularly those at IBM — assume that many tasks performed in hardware can be performed by optimizing compilers, allowing the pipelining problem discussed earlier to be solved without hardware.

In addition, RISC supporters argue

that complex machines like the VAX could not fit onto a single chip. DEC was forced to leave a number of very complex instructions out of its single-chip Microvax and to emulate them in software. The RISC proponents leapt on this fact and used it to justify their approach.

Motorola experienced difficulties in testing the 68010 and in debugging its logic, and National Semiconductor Corp. was late in delivering the NS 16000 series 32-bit single-chip machines, adding fuel to the RISC camp's fire.

The RISC supporters argue that CISC-based machines are hard to design and debug and that they are slow; the superficial evidence seemed to support this. Quite possibly, RISC's simplicity of design and its short product development cycle prompted HP and several others to

adopt RISC designs.

However, there is one very serious factor limiting RISC CPU performance — memory bandwidth.

A memory bandwidth problem

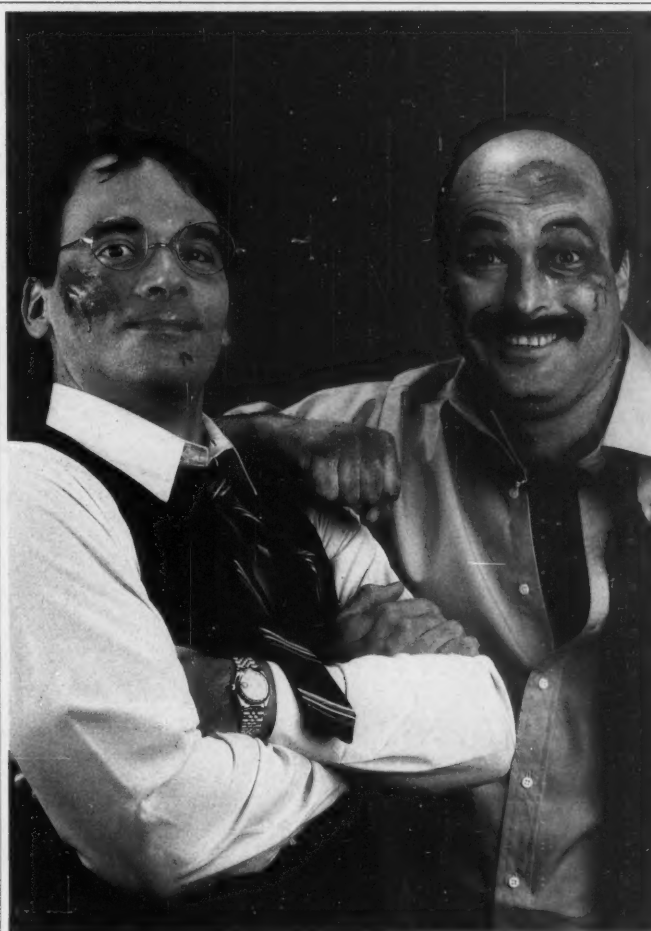
The discussion so far has pointed out that a CISC-based machine executes many microcycles to achieve what may take several instructions on a RISC-based machine — this is the price paid for organizational simplicity.

As a result, the RISC machine has a higher demand for memory accesses than a CISC-based one. The reason for this is that a complex instruction will be fetched once from memory and then generate a number of references to internal microcode store, while RISC must make several memory references to achieve the same result.

The increase in memory access demand can be further aggravated because many CISC machines have variable-length instructions, further reducing memory accesses created by instruction execution. Memory may be significantly slower than the CPU, and the performance of a RISC architecture will suffer badly.

RISC designers will actually be forced to copy DEC's software-emulation approach. But they will need to come from the other direction to reduce the memory traffic created by instruction execution. They will be forced to send complex functions such as floating-point operations to another chip that can either execute them in parallel or simply run faster because of the use of microcode.

Ultimately, the ratio between clock cycle time and instruction execution time must be made as low as



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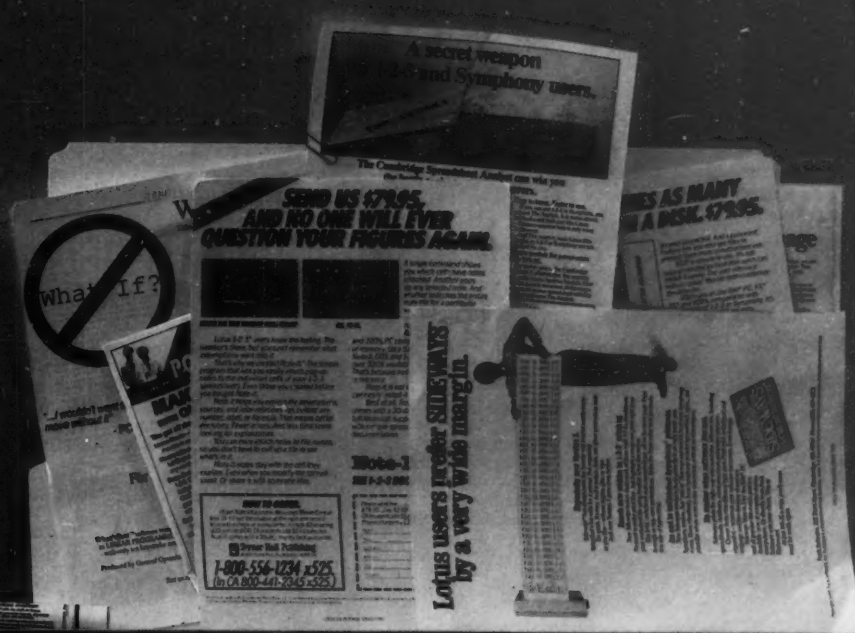
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In Depth/RISC Debate

possible, and parallelism is the only way. In fact, HP is already doing this, producing slightly incompatible Unix and commercial machines as a result.

In addition, RISC designers will move toward a form of microinstruction called "extracodes." These frequently used instruction sequences invoked by an extracode call were introduced in the 1950s at Manchester University in the UK by the designers of the Atlas high-performance machine. Atlas had a small quantity of very high-speed memory that was used to hold these sequences.

Modern miniprocessor chips will possess significant amounts of on-chip read-only memory (ROM) that could be used in this manner without the introduction of microcode. RISC designers will use this ROM for

extracodes to achieve improved performance when executing HLL programs.

The argument about RISC and CISC may become irrelevant for machines implemented in silicon as the design capability of major semiconductor and CPU designers increases. NEC Corp. has recently announced the V60, a 375,000-transistor, 32-bit CPU on a single chip. This is micro-coded and has floating-point, instruction prefetch and memory management on a single chip. It is a CISC of moderate complexity and has 273 instructions.

I am not convinced that RISC is a viable alternative to CISC, and the NEC example would seem to prove this. One should not assume, however, that RISC is totally irrelevant.

Design limitations have a habit of repeating themselves, forming a

fugue-like cycle in which a theme reappears in a different domain, only slightly modified.

Technology cycle: Gallium arsenide

The restrictions that the RISC concept was to solve are rapidly disappearing for today's designers of VLSI computers, as shown by the NEC V60. However, they have reappeared as design limitations for a new semiconductor technology, gallium arsenide, which offers a factor of 5 to 10 increase in switching speed, with clock speeds of around 5 nsec being appropriate for a CPU.

Gallium arsenide technology does not currently allow scales of integration exceeding 25,000 transistors per chip, so the only architecture capable of being implemented is RISC. Gallium arsenide's performance payoff is relatively greater because the

performance losses from signals being taken off-chip are more severe than for silicon.

Suitable pipelined architecture makes it possible to design a single-chip CPU capable of a realistic speed around 90 MIPS. It should be kept in mind, however, that the raw speed of the machine is 200 MIPS. These losses result from two details that RISC proponents dismiss as insignificant. Thirty-two percent performance is lost because of the nonoperation instructions needed to avoid the pipeline contention problem, while a further 32% reduction occurs because of memory bandwidth limits.

The pure RISC concept is not likely to be the basis of future machines implemented in silicon. RISC-based designs will, however, be important where it is necessary to squeeze a high-speed CPU onto a single chip with low yield. This challenge continues in working with gallium arsenide, where chip designers can fit only 15,000 to 20,000 gates on a chip, compared with approximately 250,000 per chip for silicon. As levels of integration increase, however, CISC architecture will reassert itself in gallium arsenide.

Judge by merits

If DP managers must become seers, oracles capable of optimizing the contribution that information makes to their employers' organizations, then a thorough study must be made of the RISC vs. CISC argument, including the history of instruction set development and the factors that influence CPU design.

One conclusion is that the RISC design philosophy is unlikely to become the real key to future price/performance improvements in large-scale data processing systems.

The market demands upward compatibility — preferably a guarantee of total software compatibility — across machine ranges. Those suppliers with large customer bases committed to a current architecture, be it RISC or CISC, will continue to move their CPU designs downward rather than develop new architectures for small systems.

Current developments in VLSI technology will make these downward moves possible, removing much of the technical motivation for RISC, which is the need to implement a high-speed CPU with a limited gate count.

In addition, the RISC concept has some disadvantages; in particular, memory bandwidth is a problem, although it can be solved by the use of caches or extracodes as mentioned above.

The fact that a machine is RISC-based should not, however, be seen as a disadvantage, since the CPU itself is only one factor determining a computer system's performance. Software and the I/O structure are equally important.

It is not possible, therefore, to argue that RISC is an absolute good or an absolute evil; it is just another design concept with some particular advantages and disadvantages.

Those systems that are RISC-based should be assessed on their own merits, such as price per unit of performance, not on the novelty of the architecture. In this context, some suppliers may be able to offer relative price/performance improvements that are related to the use of RISC — for the time being. ■



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MANAGEMENT



TAKING CHARGE

Richard L. Bernacchi
and Peter B. Frank

Tax reform: Looking ahead

The Internal Revenue Code of 1986 is the most significant and comprehensive tax legislation adopted in the past 30 years. The primary objective of the legislation is to provide greater fairness in a tax code that, over the years, has evolved into a patchwork of purported tax incentive cures for a wide variety of social and economic problems.

Fairness, however, cannot always be accompanied by simplicity. This restructured tax law is complex, and its far-reaching effects on computer users cannot be fully analyzed here. Nevertheless, there are certain provisions of the legislation that are sure to have an impact on all computer users. Among these provisions are:

- Reduction of the corporate tax rate.
- Repeal of the investment tax credit.
- Modification of the equipment depreciation or cost recovery rules.
- Modification of the credit allowed for research expenditures.

Maximum corporate tax rates for calendar-year corporations will be reduced from 46% to 40% for 1987 and to 34% for 1988, thereby reducing the value of depreciation and amortization deductions and increasing the net after-tax cost of capital investments such as purchases of computer systems to many businesses.

The investment tax credit (ITC) has
See **TAX** page 80

Bernacchi is a partner with the Los Angeles law firm Irell & Manella. Frank is a partner with the Los Angeles office of Price Waterhouse & Co.

DP trainers air frustrations

Some act to enhance their services, image

By Mitch Betts

WASHINGTON, D.C. — Data processing trainers, the people who train end users, programmers and managers in computer skills, just do not get any respect, according to speakers at the Data Training Conference held here recently.

Whether they use classroom courses or computer-based training (CBT), trainers are viewed by some executives, including some MIS managers, as running academic, self-serving programs irrelevant to their companies' actual business, several speakers said.

One of the major reasons cited for this lack of respect is failure by top managers to appreciate the value of training, which has prompted a variety of tactics for enhancing the value or visibility of training programs.

Surveys by Brandon Systems Institute of Maryland, Inc., a Rockville, Md.-based DP training firm, support the position that trainers feel ignored. "Communications with management have been poor and training needs have not been communicated, students have been diverted or pulled out of class and training budgets have been miserly," the company's 1986 report states.

"Our profession is in its infancy and has yet to make an impact on the overall business community," said Michael Hoisch, a former DP trainer and now a career specialist at the CompuSearch division of Management Recruiters International, Inc. in Omaha. "Whether this is because training is considered a luxury or because trainers have not been able to establish credibility is only part of the answer. The major responsibility may lie in the lack of visible

return on investment that training provides," he said.

Consequently, the training department is often the first to be hit with budget cuts, despite the productivity improvements that trainers claim their work generates.

Connie Perren, DP education coordinator for the University of Texas Medical Branch at Galveston, said she combats the problem by interviewing programmers and DP managers to find specific DP problems that could be solved through additional training.

Likewise, Karen Cruse, manager of planning and training at the Federal National Mortgage Association in Washington, said her workers began to market themselves not only as trainers but as consultants. "We wanted to help with problems and be, first and foremost, a service unit to the DP organization," she said.

In order to get more respect for training programs, Robert D. Hargrove, assistant to the DP director at the University of Texas Health Science Center at Houston, said it is important for training managers to have access to top management.

Hargrove said he resorts to "guerrilla tactics" to get that access. "I know that our executive vice-president

wants to proofread any articles that are submitted from our organization. So I submit training articles — some not for publication but just for him to review — because I know that way I'll have an audience with him," he explained.

For some projects it works best to use technical managers instead of professional trainers for classroom instruction, according to Pat Baxter, former office automation manager at the Clevepak Corp. in Purchase, N.Y.

When the firm's payroll system was converted from an IBM System/38 to a
See **TRAINERS** page 77

INSIDE

Calendar: Selected conferences, exhibitions, seminars/74

Managers on the Move/77

INSTANT ANALYSIS

"Vendors in general do not understand user needs. They arrive at conclusions about hardware and software needs based on internal views rather than by interfacing with the user community."

— Brian R. Blackmarr, president, B. R. Blackmarr & Associates

Training woes

The most serious problems faced by DP trainers

1. Freeing students from work.
2. Low priority in daily management decision making.
3. Budget constraints.
4. Poor communication with managers.
5. Facilities not available.
6. Difficulty getting experienced instructors.

Information provided by Brandon Systems Institute of Maryland, Inc. 1986 survey of 275 DP trainers.

MANAGEMENT MEMO

Growth in DP hiring, rise in entry jobs seen in future

Data processing hiring will grow in the first half of this year from the last six months of 1986, according to a survey by the CompuSearch division of Management Recruiters International, Inc. in Cleveland.

Of 534 companies surveyed, 38% said they would increase DP staffs in the first half of this year — an increase of 4.8% from the second half of 1986. Only 9.4% said they would reduce staffs — a decrease of 4.3% from last year.

In some industries, reports of employment growth were more predominant. They included primary metals, with 66.7% increasing staffs; furniture and fixtures, with 58.3% showing an increase; data process-

ing, with 57.5% adding staff members; and chemicals, with 53.6% increasing staffs.

Looking further into the future, Rochester Institute of Technology said **many companies will increase entry-level computer systems jobs** 40% to 50% in the next four years.

Areas of strong growth will include telecommunications, networking and distributed systems, software engineering and artificial intelligence, said Wiley McKinzie, director of the Institute's School of Computer Science and Technology.

While such positions generally have been filled internally, they will become standard jobs with starting

salaries near \$28,000 for holders of undergraduate degrees, he said.

"Companies that used to hire students with degrees in computer science will be looking for students in other disciplines with significant computer expertise," added Guy Johnson, chairman of the school's Department of Applied Computer Studies.

There is relatively little chance a company's auditing firm will lose objectivity by consulting on the design and installation of a computer system, according to a survey.

Helping design and install a system was said to pose little or no chance of impairing objectivity by

66% of executives, financiers, attorneys and others, the survey reported. Helping design a system was described similarly by 73% of respondents, second only to studying a plant location, at 75%.

The evaluations contrast with those for other consulting services, which were judged to pose a great deal or some lack of objectivity. They include negotiating mergers and divestitures, cited by 76%, implementing a strategic plan, 63%, and renegotiating a procurement contract, 50%.

The survey was conducted for the Public Oversight Board of the American Institute of Certified Public Accountants, New York.

MANAGEMENT



CALENDAR

JANUARY 18-24

Comlease Winter. New Orleans, Jan. 19-23 — Contact: Comlease, 3825-I South George Mason Drive, Falls Church, Va. 22041.

JANUARY 25-31

Networking PCs. Cleveland, Jan. 26-27 — Contact: T. Jess Seiple, American Institute, 55 Main St., Madison, N.J. 07940. Also being held Jan. 29-30 in Denver, Feb. 5-6 in Kansas City, Mo., and Feb. 9-10 in Boston.

How to Negotiate with IBM. Orlando, Fla., Jan. 26-28 — Contact: ICN, 238 Christopher St., Upper Montclair, N.J. 07043.

Entity Modeling: Techniques and Application. Chicago, Jan. 26-30 — Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

Integrating Purchasing, Receiving and Accounts Payable Systems. Philadelphia, Jan. 26-30 — Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

Mapper Installation, Coordination and Support. Dallas, Jan. 26-30 — Contact: Compumetrics Training Institute, P.O. Box 58383, Houston, Texas 77258.

NCITD Informational Forum. New Orleans, Jan. 27 — Contact: Eugene A. Hemley, Executive Director, National Council on International Trade Documentation, Suite 1200, 350 Broadway, New York, N.Y. 10013.

Annual Conference on Improving Productivity in EDP System Development. Phoenix, Jan. 27-30 — Contact: Applied Computer Research, Inc., P.O. Box 9280, Phoenix, Ariz. 85068.

IBM PC XT-PC AT Course. Morristown, N.J., Jan. 28-30 — Contact: The American Institute, 55 Main St., Madison, N.J. 07940.

1987 RIA Annual Meeting. San Diego, Jan. 28-30 — Contact: Robotic Industries Association, P.O. Box 3724, 900 Victors Way, Ann Arbor, Mich. 48106.

Computer Graphics New York '87. New York, Jan. 28-30 — Contact: Exhibition Marketing & Management, Inc., Suite 690, 8300 Greensboro Drive, McLean, Va. 22102.

Keeping U.S. Manufacturing Globally Competitive. San Diego, Jan. 28-30 — Contact: Robotic Industries Association, P.O. Box 3724, 900 Victors Way, Ann Arbor, Mich. 48106.

Conference on Desktop Communications. San Francisco, Jan. 28-31 — Contact:

The Seybold Group, Inc., Suite 132, 20695 Western Ave., Torrance, Calif. 90501.

Being More Profitable and Competitive with PC CAD/D. Sarasota, Fla., Jan. 30 — Contact: Maura Belliveau, Graphic Systems, Inc., 180 Franklin St., Cambridge, Mass. 02139.

FEBRUARY 1-7

Computer and Electronic Printers. Key Biscayne, Fla.,

Feb. 1-3 — Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

Integrated Systems: What Can Be Done Today? San Antonio, Feb. 1-4 — Contact: International Communications Association, Suite 710, LB-89, 12750 Merit Drive, Dallas, Texas 75251.

1987 ABA Bank Telecommunications & Data Processing Workshop. San Diego, Feb. 1-4 — Contact: American Bankers Association,

1120 Connecticut Ave. N.W., Washington, D.C. 20036.

Understanding Data Communications. Boston, Feb. 2-3 — Contact: Data-Tech Institute, P.O. Box 2429, Lakeview Plaza, Clifton, N.J. 07015.

Long Range Information Systems Planning. Dallas, Feb. 2-5 — Contact: American Management Association, 135 West 50th St., New York, N.Y. 10020.

Instructional Computing

Conference VII. Orlando, Fla., Feb. 2-5 — Contact: Florida Department of Education, Educational Technology Section, Knott Building, Tallahassee, Fla. 32399.

Third International Conference on Data Engineering. Los Angeles, Feb. 2-6 — Contact: The Computer Society of the IEEE, Inc., 1730 Massachusetts Ave. N.W., Washington, D.C. 20036.

Automated Clean Room Processes. San Jose, Calif., Feb. 3-4 — Contact: Robotics

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International of Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

Digital Image Processing. Washington, D.C., Feb. 3-6 — Contact: Integrated Computer Systems, P.O. Box 3614, Culver City, Calif. 90231. Also being held Feb. 24-27 in Palo Alto, Calif., March 17-20 in Boston and March 24-27 in Washington, D.C.

Machine Vision and Image Recognition. Washington, D.C., Feb. 3-6 — Contact:

Integrated Computer Systems, P.O. Box 3614, Culver City, Calif. 90231. Also being held Feb. 10-13 in San Diego, March 10-13 in Anaheim, Calif., April 7-10 in Palo Alto, Calif., and April 21-24 in Washington, D.C.

Implementing LAN in Your Organization. Milwaukee, Feb. 4-6 — Contact: Peter L. Tocups, Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 North Sixth St., Milwaukee, Wis. 53203.

Wis. 53203.

National Information System Quality Assurance Association Meeting. New York, Feb. 5 — Contact: Pat Ragozzino, Peat, Marwick, Mitchell & Co., 1600 National City Center, Cleveland, Ohio 44114.

FEBRUARY 8-14

12th Annual SAS Users Group International Conference. Dallas, Feb. 8-11 —

Contact: SUGI Registration, SAS Institute, Inc., Box 8000, SAS Circle, Cary, N.C. 27511.

Advances in Marketing Analysis: Research Applications and Decision Support Systems. Philadelphia, Feb. 8-13 — Contact: The Registrar, Office of Executive Education, The Wharton School, University of Pennsylvania, 200 Vance Hall, Philadelphia, Pa. 19104. Also being held May 3-8 in Philadelphia.

Planning, Scheduling,

and Controlling Technical Projects. Los Angeles, Feb. 9-10 — Contact: American Management Association, P.O. Box 319, Saranac Lake, N.Y. 12983. Also being held March 9-10 in Cambridge, Mass.

Fourth and 5th Generation Data Management Software. Boston, Feb. 9-10 — Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810. Also being held March 2-3 in Chicago.

Project Management Software. New York, Feb. 9-11 — Contact: American Management Association, P.O. Box 319, Saranac Lake, N.Y. 12983. Also being held March 23-25 in Chicago, Ill.

How to Design & Improve a Cost Information & Control System. Los Angeles, Feb. 9-11 — Contact: American Management Association, P.O. Box 319, Saranac Lake, N.Y. 12983. Also being held Feb. 18-20 in Boston, Feb. 25-27 in Chicago, March 9-11 in New York, March 16-18 in Washington, D.C., and March 23-25 in Dallas.

Key Issues in Managing Information Systems. St. Petersburg, Fla., Feb. 9-12 — Contact: American Management Association, 135 W. 50th St., New York, N.Y. 10020.

ATI '87 Eighth Annual Conference on Automated Technology, CAD/CAM and Engineering Data Handling. Monterey, Calif., Feb. 9-12 — Contact: Automation Technology Institute, P.O. Box 242, Pebble Beach, Calif. 93953.

Communications Networks '87. Washington, D.C., Feb. 9-12 — Contact: CW/Conference Management Group, P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.

1987 Invitational Computer Conference — Computer Graphic Series. San Jose, Calif., Feb. 10 — Contact: Conference Management, B. J. Johnson & Associates, Inc., 3151 Airway Ave., C-2, Costa Mesa, Calif. 92626. Also being held Feb. 24 in Dallas, April 23 in Munich, W. Germany, April 29 in London, May 5 in Paris, Sept. 17 in Fort Lauderdale, Fla., Oct. 1 in Newton, Mass., and Oct. 14 in Irvine, Calif.

Technology Opportunity Conference. London, Feb. 10-12 — Contact: Rothchild Consultants, 256 Laguna See CALENDAR page 76

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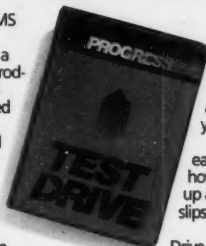
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Series/1

MANAGEMENT

CALENDAR from page 75

Honda Blvd., San Francisco, Calif. 94116.

Computer Aided Publishing '87. Washington, D.C., Feb. 10-12 — Contact: Computer Aided Publishing, Suite 200, 90 W. Montgomery Ave., Rockville, Md. 20850.

Systems Design & Integration Conference. San Jose, Calif., Feb. 10-12 — Contact: Electronic Conventions Management, 8110 Airport Blvd., Los Angeles, Calif. 90045.

Creating Box Structured Information Systems: A New Approach for Information Systems Analysis and Design. Orlando, Fla., Feb. 11-13 — Contact: Center for Management Development, College of Business and Management, University of Maryland, College Park, Md. 20742.

1987 Bank Data Security Technical Symposium. Orlando, Fla., Feb. 11-13 — Contact: Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

AM/FM International Regional Conference on Automated Mapping/Facilities Management. Orlando, Fla., Feb. 11-13 — Contact: Barbara Emery, AM/FM International, #820, 8775 E. Orchard Road, Englewood, Colo. 80111.

South Florida Data Base Users Group. Ft. Lauderdale, Fla., Feb. 12 — Contact: 4780 N. State Road 7, Ft. Lauderdale, Fla. 33319.

Pre-CADD '87, An Inside Look at Implementing Automation in China and The USA-China Business Environment. Monterey, Calif., Feb. 12-13 — Contact: Automation Technology Institute, P.O. Box 242, Pebble Beach, Calif. 93953.

FEBRUARY 15-21

Electronic Imaging '87. Anaheim, Calif., Feb. 16-19 — Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

15th Annual Association for Computing Machinery Computer Science Conference. St. Louis, Feb. 16-19 — Contact: Department of Computer Science, University of Pittsburgh, P.O. Box 13526, Pittsburgh, Pa. 15243.

Showcase '87. Indianapolis, Feb. 17-19 — Contact: U.S. Telecommunications Suppliers Association, Suite 1618, 333 N. Michigan Ave., Chicago, Ill. 60601. Also being held April 14-16 in Las Vegas.

Electronic Data Interchange. Alexandria, Va., Feb. 18 — Contact: American Trucking Association Management Systems Committee, 2200 Mill Road, Alexandria, Va. Also being held April 30 in Kansas City, Mo.

Resource Planning for Central File Conversion.

New Orleans, Feb. 18-20 — Contact: Innovative Systems, Inc., 341 Fourth Ave., Pittsburgh, Pa. 15222.

Interactive Instruction Delivery. Kissimmee, Fla., Feb. 18-20 — Contact: Society for Applied Learning Technology, 50 Culpeper St., Warrenton, Va. 22186.

Advanced Configuration Management II. San Diego, Feb. 19-20 — Contact: TMSA Seminars, c/o Technology Training Corp., Dept. ACM2, P.O. Box 3608, Torrance,

Calif. 90510.

FEBRUARY 22-28

1987 User Group Conference. Marina del Rey, Calif., Feb. 22-25 — Contact: Trax Software, Inc., 10801 National Blvd., Los Angeles, Calif. 90064.

Fourth Annual Electronic Printing Systems Conference. Miami, Feb. 22-26 — Contact: Dunn Technology, Inc., Suite 1, 1855 E. Vista

Way, Vista, Calif. 92084.

Exchange Carriers Standards Association Technical Subcommittee T1Q1. Orlando, Fla., Feb. 23-27 — Contact: Radisson Plaza Hotel Orlando, 60 South Ivanhoe Blvd., Orlando, Fla. 32804.

IBM: Mastering the Transition 1987-1992. New York, Feb. 24-25 — Contact: The Yankee Group, Seminar Division, 200 Portland St., Boston, Mass. 02114.

Computer Aided Software Engineering Sympo-

sium. Atlanta, Feb. 24-26 — Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

Introduction to Performance/Capacity Management. Phoenix, Feb. 25-27 — Contact: Applied Computer Research, Inc., P.O. Box 9280, Phoenix, Ariz. 85068.

ICIA '87/Commtext International. Atlanta, Feb. 25-28 — Contact: International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

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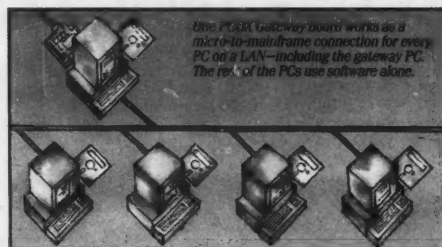
Now PCs on your LANs can talk to your mainframe as easily as they talk to each other.

Talk about resource sharing. All it takes is one PCOX Gateway to deliver full mainframe privileges to all the PCs on a LAN. And talk about resource saving. A PCOX Gateway can save you all kinds of modems, controllers, terminal emulators and line costs.

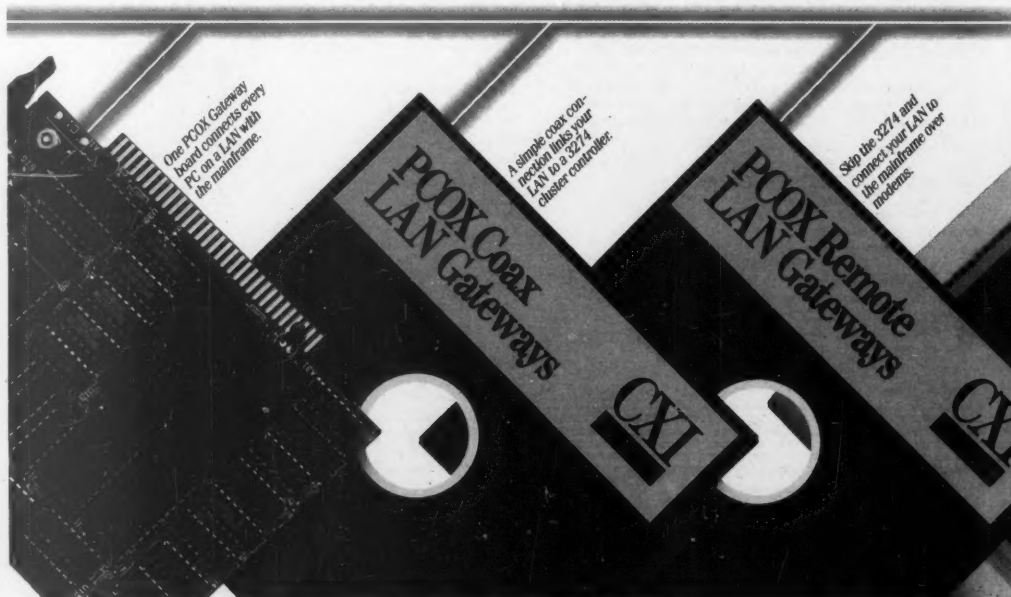
Each PCOX Gateway is a single board that plugs into a single slot on a single PC on the LAN. And unlike other gateways, PCOX Gateways let every PC on the LAN

talk to the mainframe, using software alone.

In fact, PCs can talk through more than a single PCOX Gateway. They can automatically seek mainframe sessions through multiple PCOX Gateways on a LAN. Then they can carry out 3278/79 emulation, 3270 PC emulation, send-receive file transfers, or even 3287 host printer emulation with their PC printers.



PCOX Gateways work in all NET-BIOS-compatible LANs, including IBM's own Token Ring and PCNetwork; plus LANs from AST, AT&T, Novell, Sytek, Ungermann-Bass and others.



MANAGEMENT

Trainers air frustrations

From page 73

System/36 due to a merger, Baxter recruited payroll, personnel and MIS managers to teach the necessary classes. She taught these managers the basic skills to become temporary trainers, in part because they had the technical expertise and in part be-

cause the training program was a rush job and she had no regular training staff.

"Training these experts to train their own people provided us with an efficient use of available skills, reliable and credible training and a cost-effective and time-effective response to a very difficult situation," Baxter claimed.

DP trainers are faced with the perennial question of whether to use classroom training or CBT, a choice that

may depend on the corporate culture and the training task at hand, according to Thomas J. Richards, a training specialist at the Internal Revenue Service.

Richards said the IRS is successfully using classroom teaching to help senior managers gain some computer literacy and to help DP professionals acquire better management skills.

But for teaching more technical skills, the U.S. Defense Logistics Agency is us-

ing about 60 CBT courses that can be downloaded onto microcomputer diskettes for distribution to the agency's 90 far-flung offices, according to Frank W. Savely, the agency's CBT program administrator.

Many end users view either method as boring and see CBT as frustrating, slow and inflexible, according to DP training consultant Gloria J. Gery.

Gery, president of Gery Associates in West Hartford,

Conn., said courses also might not work because users' requirements vary. What is needed are highly flexible CBT courses that allow trainers to tailor courses to users' needs, she said.

DP training also will become more flexible through the use of embedded training techniques such as windows and memory-resident programs, natural language queries, simulations, content-sensitive Help and diagnostic screens, Gery added.

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PCOX Gateways are products of PCOX Technology, a modular system of advanced micro-to-mainframe connections that helps manage PC demands for mainframe access.

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William L. Harrison, former director of information management for **The Hartford Insurance Group**, has been named the company's director of operations, processing and planning.

Harrison succeeds **Robert S. Slička**, who has been named senior vice-president of **ITT Corp.**, The Hartford's parent company.

Harrison has also been elected chairman of **Redshaw, Inc.**, The Hartford's majority-owned subsidiary that markets automated systems to independent insurance agents, and will be responsible for **CLA Corp.**, a subsidiary that sells automation services to other insurance companies.

John T. Crawford, director of data processing systems, will succeed Harrison as director of information management.

Gregory S. Staszko has been named partner in management advisory services of **Deloitte Haskins & Sells** in Cincinnati. Staszko was formerly a director of systems implementation services for **KMG Main Hurdman**.

Independence Information Systems, a subsidiary of **Independence Bancorp** in Perkasie, Pa., has named **Patricia L. Bleasdale** administrative vice-president and director of management information systems. Bleasdale was systems manager at **Norwich Eaton Pharmaceuticals**, a subsidiary of **Procter & Gamble Co.**

In an effort to expand its information technology center, **Booz, Allen & Hamilton, Inc.** in Chicago has named **James M. Stierwalt** a vice-president. Stierwalt is leading a multimillion dollar effort by the Chicago-based **Railroad Retirement Board** to design a retirement claims processing system.

Joel Rubin has been promoted to vice-president of information systems for **Avis Leasing Corp.** in New York.





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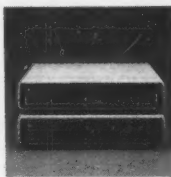
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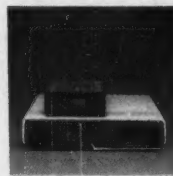
the network to handle the tremendous flow of buy and sell orders. With millions of dollars traded every minute, consider what a half-hour of downtime would add up to. And what the same amount of downtime would cost *your* company.

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724 TMUX

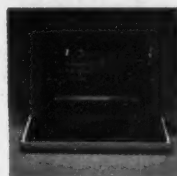
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It can have a calming effect on your workplace.

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MANAGEMENT

Tax reform: Looking ahead

From page 73

been repealed for all types of equipment, including computers. Except for certain limited transition rules for procurements or construction in progress during 1985, the repeal of the ITC is retroactive to the beginning of 1986. Hence, in determining the net after-tax cost of computer systems, the ITC generally will not be a consideration.

Changes in the rules for depreciation, or cost recovery, are more favorable with respect to computer equipment than to other types of property. The five-year life for depreciation purposes has been re-

tained under the new code while depreciation lives for other assets have been stretched out.

Furthermore, the 200% declining balance method of depreciation is available for computer equipment, as opposed to the 150% declining balance method that was previously available.

The result is that deductions for purchases of equipment may be more favorable, although worth somewhat less after taxes because of the reduced tax rates.

77

Many businesses will benefit from deferring income until 1988 and accelerating expenses into 1987, when tax rates will be higher.

The credit for research and experimentation expenditures, added to the tax law in 1981, has been an important provision for companies in research-intensive industries. The new tax law retains this credit. The credit, however, is reduced to 20% from 25%.

Further, the new law more clearly defines the types of research expenditures that must be excluded in computing the tax credit. It provides that expenditures will qualify only if the research is technological in na-

ture, is part of an experimentation and is useful in the development of a new or improved business product, process, formula or invention. Software must be truly innovative and developed at significant risk to be eligible for the credit.

In general, many businesses will benefit from deferring income until 1988 and accelerating expenses into 1987, when tax rates will be higher. This traditional tax planning technique will be a particular benefit to companies that expect to be in the top corporate brackets. First, the tax deferred until 1988 generates a time-value-of-money benefit by deferring tax payments. Further, since rates will be lower in 1988 than in 1987, a permanent tax saving will result.

Additional considerations of less general applications include the following:

- Certain corporations may wish to evaluate the benefit of S corporation status. An S corporation is essentially treated for tax purposes as a partnership. In other words, corporate income, losses and credits pass through to the shareholders' individual returns. The drop in the top rate applicable to individuals below the corporate rate has generated new interest in S corporations. If the requirements for S corporation status are met, the income of the corporation is taxed only once, at the shareholder level.

- The demise of the investment tax credit retroactive to Jan. 1, 1986, may require amending returns for corporations that have already filed returns for fiscal years that included a period after Dec. 31, 1985, if, for example, the corporation overstated the allowable investment tax credit.

- Finally, the new law contains a provision of particular interest to companies that sell software. Several years ago the Internal Revenue Service ruled that one company that produced computer software for use by customers was a personal holding company. The effect of this unfavorable ruling was an additional tax on that corporation's undistributed income, known as the personal holding company tax.

The IRS ruling was based on the premise that the revenue from licensing software is technically royalty income, which is one type of personal holding company income.

Under the new law, licensing computer software is generally exempted from personal holding company income if the company is actively engaged in the computer software business and derives at least 50% of its ordinary gross income from software royalties in a given year, along with other requirements.

Furthermore, the exception is effective for royalties received before, on or after Dec. 31, 1986. So the exception is effective for all open tax years, including those still open for refund purposes under the applicable statute of limitations.

Therefore, software companies that previously paid the personal holding company tax should review the provision to determine whether refunds may be obtained by filing amended returns for years still open under the statute of limitations.

The 1986 code contains many opportunities for the careful business planner. It is difficult to overstate the importance of proper timing of transactions, selection of accounting methods and forms of doing business.

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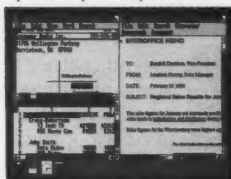
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Departmental Computing	May 6	April 3	Comdex/Spring
Applications Solutions	June 3	May 1	NCC
Software**	July 8	May 29	Siggraph
PC's	August 12	July 3	PC Expo
Communications	September 2	July 31	TCA & Info '87
Information Centers**	October 7	September 4	
PC's	November 4	October 2	Comdex/Fall
Software	December 2	October 30	Dexpo West

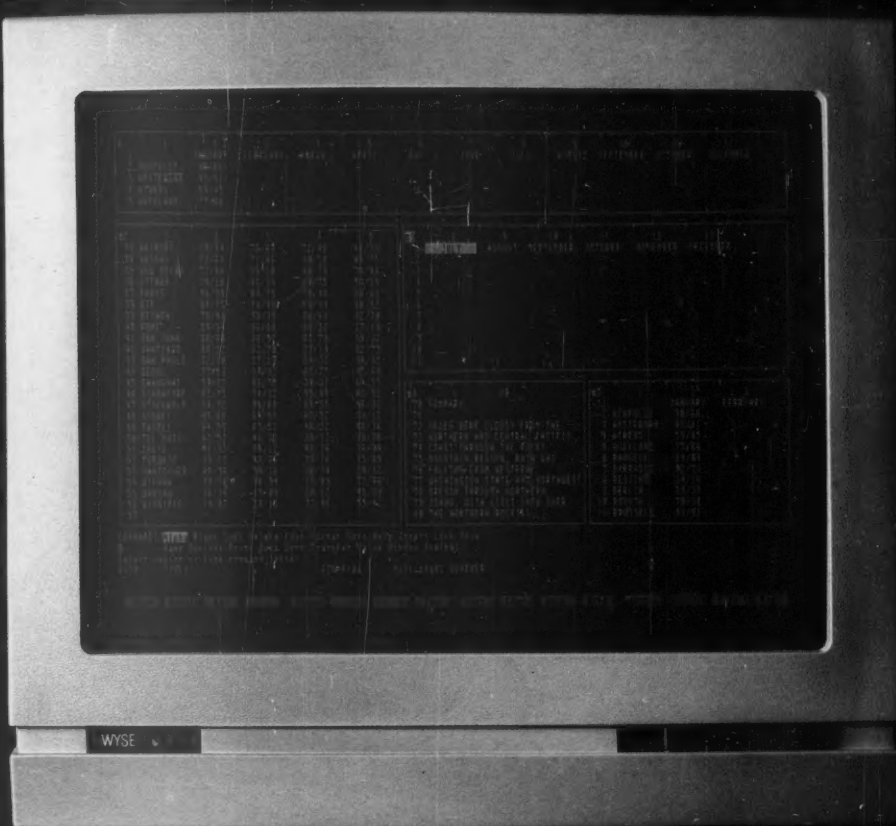
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NEW PRODUCTS

Add-on vector processor bows for DEC minis

NEWTON, Mass. — Numerix Corp. has introduced an add-on vector processor for use with Digital Equipment Corp. VAX computers in scientific environments as well as engineering computing environments.

The company claimed that the NMX-464 can be tightly coupled to the VAX hardware and to the VAX/VMS operating system to provide peak performance of 12 million to 24 million floating-point operations per second.

It reportedly features a 32-bit and 62-bit mixed-mode arithmetic capability that allows a user application to be optimized for speed and precision in a single processor.

Modeling uses

The NMX-464 was designed for use in application areas such as molecular and reservoir modeling, finite element analysis and electronic circuit simulation.

Numerix officials claimed that the processor supports virtual program memory sizes of up to one million instructions and that the NMX-464 also supports data memory sizes of up to 64M bytes.

The software includes an optimizing Fortran compiler that speeds vector and scalar program execution without the need for microcode programming, according to the vendor.

VAX/VMS transparency

The company claimed the NMX-464 architecture provides VAX/VMS transparency.

An entry-level version of the NMX-464, including software and support for four users, costs \$66,500.

The entry-level version is intended for use with small DEC systems such as the Microvax II and VAX 8200.

Multiple units can be used with larger DEC processors, such as the VAX 8550 and VAX 8800.

Systems Strategies link ties VAX users to SNA

Systems Strategies, Inc. in New York, an AGS company, has introduced VAX-Link, a family of Digital Equipment Corp. VAX-to-IBM communication software packages.

The VAX-Link family is said to enable VAX and Microvax computer users to interconnect with IBM Systems Network Architecture (SNA) and Binary Synchronous Communications (BSC) networks, as well as exchange information through international CCITT X.25 packet-switched networks.

The software is available on VAX and Microvax systems under Ultrix, AT&T Unix and VMS operating systems.

The VAX-Link packages are downloaded in random-access memory (RAM) onto DEC's high-performance communication processor boards, such as the KCT for the VAX Unibus and the KMV for the Microvax Q-bus. Installation of the software is

said to require no modification to existing DEC or IBM software.

Features of the VAX-Link family include autodial capabilities, menu-driven operation, full-color terminal capability, multiple protocol support in a single processor and multiple user support. In addition, users are said to be able to move between local VAX applications and IBM mainframe applications with a single keystroke.

Members of the VAX-Link software family include: VAX-Link/SNA 3270, VAX-Link/BSC 3270, VAX-Link/LU6.2, VAX-Link/SNA RJE and VAX-Link/BSC RJE. The VAX-Link/X.25 package allows DEC users to interface with packet-switched networks.

Single-copy pricing for the VAX-Link software packages ranges from \$3,500 to \$10,000.

Quanta announces 2000 series

Multiplexers provide options to 3270 users

Quanta Communications Systems, Inc. (QCS), an associate company of the Racal-Vadic group based in Anaheim, Calif., has announced the 2000 series family of multiplexers.

According to a company spokesman, the multiplexers, the 2100MX, the 2200MX, the 2300MX, 2500MX and the 2600MX, were designed to eliminate cable runs in IBM 3274 controller installations as well as provide a range of options to 3270 users.

The vendor said that a single center link, which may be either RG62A/U coaxial cable or multimode optical fiber, transmits data at 2.3587M bit/sec. between multiplexers.

The product line begins with the basic 2100MX, which supports up to eight IBM Type A and compatible devices. The most advanced model, the 2600MX, comes complete with a redundancy feature, full front-panel diagnostics and support for up to 32 devices.

Separate devices

The 2000 series is said to eliminate the need for separate devices at the controller and terminal ends of the system. According to a company spokesman, the 2000 multiplexers are compatible with all other QCS 2000 series products.

External dip switches allow multidrop addressing control with transmission up to 5,000 feet between controller and terminal.

Prices start at \$800. The multiplexers are available immediately, the vendor said.

Talaris Systems printer debuts Honeywell offers IBM links

Talaris Systems, Inc. in San Diego has announced a 15 page/min. laser printer featuring 21 standard fonts and a dual-page buffer in the print controller.

Called the Talaris 1500, the desktop printer is said to have a resolution of 300 dot/in. and a full-page bit-map controller for formatting complex graphics images and text at full resolution. The controller is equipped with 3.5M bytes of random-access memory (RAM) and a Motorola, Inc. 68000 for formatting complex pages before printing.

The printer can print on plain cut-sheet paper of weights ranging from 16 to 24 lb and on transparencies, labels or prepunched paper. It has two 250-sheet paper trays and a 500-sheet face-down output tray.

The dual-page buffer keeps the Talaris 1500 up to its rated speed of 15 page/min. by preparing a second bit map while the first is printing.

Graphics features include Tektronix, Inc. 4014 graphics emulation with four sizes of Tektronix fonts; polygon fill with 23 patterns, their reverse and solid black and white; end-point vector graphics processing for drawing lines from one to 31 dots wide; and raster graphics processing. The Talaris 1500 also has modes to accept data meant for printing on a Diablo Systems, Inc. 630 ECS or Qume Corp. Sprint daisywheel printer.

Priced at \$11,900, the Talaris 1500 is available with a variety of interfaces including an RS-232, a Dataproducts Corp. parallel and an IBM 3274A. Talaris provides system support for Digital Equipment Corp. VAX/VMS, IBM VM/CMS, University of California at Berkeley Unix Version 4.3, System V Unix, IBM RT Personal Computer AIX, Prime Computer, Inc. Primos and IBM PC-compatible computers.

Multiplexer hooks controller, I/O device

Honeywell, Inc.'s Optoelectronics Division, based in Richardson, Texas, has announced the Honeywell HFN9318 fiber-optic multiplexer, which is said to provide interference-free data communications links for IBM 5251 cluster controller systems.

According to the Optoelectronics Division, the HFN9318 multiplexer operates with other Honeywell fiber-optic components, the HFN9308 multiplexer and the HFM5300 and HFM5305 modems, to provide light-wave data links between IBM 5251 controllers and their I/O devices.

In a typical configuration, the vendor said, the HFN9308 multiplexer is located at the controller site and is connected to the IBM 5251 by coaxial cable.

Located remotely, the HFN9318 multiplexer provides fiber-optic links to the HFN9308 multiplexer and, through the modems, to the I/O devices.

Full-duplex operation

Attributes of the HFN9318 multiplexer include eight twinaxial ports and the ability to multiplex all signals onto a single fiber-optic cable with full-duplex operation.

With a link budget of 18dB into a 50/125-micron cable, the HFN9318 multiplexer permits the installation of cable through several bulkheads up to the maximum distance of 4,700 meters, or 15,200 feet, the vendor said.

Priced at \$8,270 for rack-mount and \$9,183 for cabinet-mount version, the HFN9318 multiplexer allows less than one error per billion bits transmitted, according to Honeywell's Optoelectronics Division.

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NEW PRODUCTS/SOFTWARE & SERVICES

SOFTWARE
& SERVICES

Systems software

SDC Software has announced Release 3.0 of its **Customer Information System** for IBM System/34, 36 and 38 minicomputers.

The software is said to be a package for maintaining customers, referrals, sales prospects and product inquiries. The new release features integrated activity entry, multiple customer contacts, an optional comment screen and the option of entering upper- or lower-case characters.

Other features include system-assigned account numbers and duplicate record detection.

Prices start at \$1,800.

SDC Software, Suite 9, 400 Hot

Springs Road Carson City, Nev. 89701.

Blue Hill Plaza, Pearl River, N.Y. 10965.

Applications packages

Online/Database Software, Inc. has announced Release 1.7 of The **Application Builder**.

Release 1.7 is said to expand the compatibility with Cullinet Software, Inc.'s IDMS/R and ADS/Online by including ADS/A functionality. Users can define complete application structures, including menus and application flow-of-control. ADS/A support enables the user to prototype applications linking the menus, application security, screen formats and program flow without processing logic.

The Application Builder costs \$4,000.

Online/Database Software, One

Trax Software, Inc. has announced **Edword**, a word processor for IBM mainframe environments.

Edword is said to combine ruler formats, menus and Help panels. Users can access text files on the mainframe that were created by other text editors. In addition, documents can be hundreds of pages long, the vendor said. Edword can integrate with the Trax spreadsheet, ESS, or run as a stand-alone word processor.

Edword runs under IBM's VM/CMS, TSO and CICS. It supports all IBM 3270-type terminals. Prices range from \$5,000 to \$8,000.

Trax Software, 10801 National Blvd., Los Angeles, Calif. 90064.

Utilities

Interactive Solutions, Inc. has announced **CICS/Replay**.

CICS/Replay is said to be a tool for quality assurance, regression testing, system tuning, stress testing and capacity planning. Features include a logging facility that captures the I/O of a terminal and establishes a session library; the ability to compare replayed screens with original screens; analyze response time and other performance-related functions; and send screen images to other terminals or a CICS printer.

CICS/Replay costs \$18,000 for an IS CPU and \$13,000 for a DOS CPU.

Interactive Solutions, 53 W. Fort Lee Road, Bogota, N.J. 07603.

Systems Strategies, Inc. has announced **VSNA/3270** emulation software.

The micro-to-mainframe communications package is said to allow VMEbus-based systems to exchange information with IBM mainframe computers over a Systems Network Architecture network. The VMEbus hosts connect to the IBM mainframe by emulating a remote 3274 cluster controller. Terminals connected to the host emulate IBM 3278 terminals.

Depending on quantity, VSNA/3270 is priced from \$600 to \$5,000.

Systems Strategies, 225 W. 34th St., New York, N.Y. 10001.

Dylakor Division of Sterling Software, Inc. has enhanced its **Dyl-On-line** under CICS, its menu-driven program development tool for creating, testing and running programs in the IBM CICS environment.

Enhancements include a new installation procedure, sign-on and password protection, the ability to choose job names tailored to meet shop standards, nine subdirectories for each user and the ability to sort selected records in descending and ascending order.

Dyl-On-line under CICS, Release 2.0 costs \$8,000 for the MVS version and \$6,000 for VSE.

Sterling Software, Dylakor Division, 17418 Chatsworth St., Granada Hills, Calif. 91344.

The Adesse Corp. has upgraded its **VM/SP Archival Storage Subsystem (Archives)** program and its **VM/SP Shared File Directory Facility (SFDF)**.

Archives is a CMS user-controlled file archival subsystem. It has been enhanced to include an end-user oriented front-end. The system combines a series of commands with a set of installation-defined procedures to control the movement of files between the subsystem's on-line staging disk and the tape archives.

Archives costs \$240 per month and SFDF costs \$86 per month.

Adesse, Suite 307, 36 Mill Plain Road, Danbury, Conn. 06811.

Woven Software has announced **SMFUTIL**, a general-purpose SMF data movement utility designed to move SMF data from one place to another.

The software is said to be able to

Now Available for VM/CMS, too.

Who is accessing your VTAM Network tonight?



With **THE NETWORK DIRECTOR**, access to your VTAM Network can be based on User Id and Password, not just terminal location.

The Network Director can require the terminal user to enter a User Id and Password before allowing the user access to VTAM applications.

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package (ACF2, RACF, TOP SECRET or The Network Director) and then presents a Selection Menu of only those applications that the user is allowed to



access. In addition, access to applications can be further restricted by terminal, time or day.

When the user makes a selection, The Network Director can pass the User Id and Password to many applications (CICS, IMS, TSO, IDMS, CMS, ROSCOE, Com-plete, and MODEL 204, for instance) to automatically sign-on the user to the application.

The Network Director can keep an audit trail of sign-on attempts, the duration

of each user-application session, and more.

For physically secured terminals, a Selection Menu can be presented without requiring identification, and for dial-up terminals the initial screen need not identify the computer installation.

At a VTAM network level, The Network Director also offers bulletin board and help, message switching, broadcast, automatic application status, and network administration facilities.

The Network Director is available for MVS, VSI, VSE, or VM/CMS environments and fully supports cross domain, ENA, and SNI.

For more information contact North Ridge Software at 206/455-9809, Telex: 5106014846 (NRIDGE SOFTWARE).

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The following are proprietary software products of:

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SBK, Inc.
ACF2

CA
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Cullinet
IDMS

Computer Corporation of America
MODEL 204

ADR, Inc.
ROSCOE

Software AG
Com-plete

NEW PRODUCTS/SOFTWARE & SERVICES

create daily and month-to-date archive tapes and subsets of specific record types with one pass of the data. It also features a set of flexible control specifications to limit the data copied to that which is required.

SMFUTIL is priced at \$6,900.

Woven Software, 7202 Holder Forest Circle, Houston, Texas 77088.

Target Systems Corp. has announced **Version 5.0** of its **Target Calendar** management software for Digital Equipment Corp. VAX/VMS computers.

The program is said to provide personal and group calendar management. Users can maintain daily appointments and meetings and calendars can be accessed by other users based on the appropriate authorization. Entries may be searched for specific text and the user can print a hardcopy listing.

Target Calendar costs from \$395 to \$795.

Target Systems, 33 Boston Post Road W., Marlboro, Mass. 01752.

Massoglia & Associates, Inc. has announced **Mapics II IDDU File Definitions** financial and manufacturing package designed for the IBM System/36.

The package is said to provide the files, file formats and field definitions to put the power of Query to use. It provides more than 2,800 preset definitions that can be loaded and linked via menus.

The complete package is available for \$495.

Massoglia & Associates, Suite 102, 4970 Northwind Drive, East Lansing, Mich. 48823.

Information Industries International has announced **Job Execution Tools (JET)**, a complete productivity system for OS users.

The JET system is said to feature a structured programming language, System Management Facility reduction, line-printer graphs and Gantt charts. It can be used to create reports, perform CPU saturation forecasting, plan projects, populate and reformat files and write letters.

A JET site license costs \$2,500.

Information Industries International, P.O. Box 3278, Humble, Texas 77347.

Services

Massoglia & Associates, Inc. has announced a series of publications for users of the IBM System/36 and 38.

The publications include *S/38 for Beginners*, *S/38 Subfiles Made Easy*, *Using the Power of Conversion Reformat (SORT) on the S/38*, *Getting Started with S/38 Edit Text*, *Advanced Methods with S/38 Edit Text*, *Getting Started with PS/38 Text Management*, *Advanced Methods with S/38* and *Everything You Always Wanted to Know about the System/38 But Nobody Told You*.

A single publication costs \$65. Any two cost \$55 each; any three cost \$50 each; and four or more cost \$45 each.

Massoglia & Associates, Suite 102, 4970 Northwind Drive, East Lansing, Mich. 48823.

Belcastro Computer Services has announced **Honos**, an off-site service for converting source code, JCL and screens from a Honeywell, Inc. mainframe to an IBM mainframe.

According to the vendor, Honos allows batch source code and JCL to be converted to either a DOS or MVS environment.

The on-line source code is converted to Command Level CICS code. Embedded screens and external screens are converted to IBM Basic Mapping Support maps, the vendor claimed.

The conversion is done off-site by Belcastro personnel prior to installation of the hardware.

According to the vendor, pricing for a conversion ranges from \$50,000 to \$300,000.

Belcastro Computer Services, 120 Millcreek Road, Niles, Ohio 44446.

MICROCOMPUTERS

Systems

Granite Systems has announced **Amy**, a turnkey microcomputer-based personnel scheduling system.

The system is said to take incoming telephone calls from employees unable to be on a shift, and then initiate calls to qualified replacement candidates in priority according to user-defined criteria. Amy also maintains attendance records and produces management reports.

The voice-response unit is a dedicated IBM Personal Computer-compatible PC with telephone line cards containing proprietary software. The host computer is IBM PC AT-compatible and stores the specific applications data base.

Amy is priced from \$28,000. Granite Systems, 3732 Mt. Diablo Blvd., Lafayette, Calif. 94549.

Software applications packages

Triangle Software Co. has announced the **CICS/PC** system, said to duplicate the functions of IBM's CICS on an IBM Personal Computer or compatible.

The CICS/PC system uses the same screens, commands and sequences that CICS programmers do, the vendor said. It allows users to develop and test mainframe CICS programs. Site licenses range from \$12,500 to \$19,500. Monthly licenses range from \$750 to \$1,250.

Triangle Software, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

ONLY INTELLECT/DB2 DELIVERS NATURAL LANGUAGE ACCESS TO DB2

INTELLECT/DB2 combines the power of DB2 with INTELLECT, the AI-based natural language software used by over 450 organizations worldwide. INTELLECT/DB2 enhances your investment in DB2 by giving managers AI-based, natural language access to DB2. INTELLECT/DB2 understands ambiguous questions and lets managers express themselves using their own vocabulary, which it learns as it's used.

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Director, MIS
Maryland Casualty Company

AI-based natural language is one of six requirements for using AI to deliver DB2 to management—and only INTELLECT/DB2 meets all six. Attend a free seminar and find out how you can use INTELLECT/DB2 to bring DB2 to your management.

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INTELLECT/DB2's, advanced AI techniques let managers use everyday English to access DB2 data.

2. AD HOC ANALYSIS

Managers get English access to totals, minimums, maximums and percentages,

correlations and ratios—automatically displayed in summary or graph form.

3. APPLICATION BUILDING

Within security constraints, managers can create and update tables, build forms for data presentation, and request reports.

4. PROPER USE OF DB2

INTELLECT/DB2 uses all DB2 capabilities to full advantage. And as an SQL generator, INTELLECT's interface to DB2 makes complete use of DB2's power while optimizing SQL coding for maximum efficiency. An automatic "Instant English" facility gets you started fast.

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Use DB2 or other databases and file structures in many ways. With our PC Link, reformat DB2 data into a Lotus 1-2-3 worksheet and send it to a PC.

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Our 11 years of delivering commercial AI solutions to over 450 businesses means you get fast, expert assistance and access to total product support including a hotline, training, and consulting. See for yourself how you can use AI to deliver DB2 to management. Call our Seminar Registration Office today at (617) 890-8400, or return the coupon.

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NEW PRODUCTS/MICROCOMPUTERS

International Microcomputer Software, Inc. has announced **Desktop Publisher's Graphics**, a graphics package designed for desktop publishing.

The graphics software package features free-hand graphics and allows the user to import, edit and enhance images from programs such as Lotus Development Corp.'s 1-2-3, Chartmaster, Microsoft Corp. Chart and Autodesk, Inc.'s Autocad. It has built-in drivers for Tall Tree's JLaser.

According to the vendor, Desktop Publisher's Graphics requires the use of an IBM Personal Computer, PC XT, AT or compatible with two drives and 512K bytes of memory. It is priced at \$195.

International Microcomputer Software, 1299 Fourth St., San Rafael, Calif. 94901.

Computerline, Inc. has announced a software package said to combine **Plantrac-CM**, its cost management program with **Plantrac**, its Critical Path Method program.

Plantrac-CM is said to provide all levels of management with a tool to estimate, plan and analyze project costs and resources against time-specific criteria. Plantrac provides scheduling, resource and cost planning and reporting features. When linked, they provide integrated scheduling and cost management.

The complete system costs \$3,695.

Computerline, P.O. Box 308, 52 School St., Pembroke, Mass. 02359.

Terrex has released **LP Model**, a financial applications program for the IBM Personal Computer said to

set up the financial framework and generate the financial projections for a real estate limited partnership.

LP requires Lotus Development Corp.'s 1-2-3. It will analyze a partnership based on commercial, residential, retail or industrial properties. Information includes cash flow from operations, sources and uses of funds, taxable income analysis, distribution and benefits per limited partner unit and projected results of sale.

LP Model costs \$1,200.

Terrex, Suite 210, 170 Caldecott Lane, Oakland, Calif. 94618.

Aegis Development, Inc. has announced **Aegis Draw Plus**, a computer-aided design package for the Amiga personal computer.

Aegis Draw Plus is said to allow up to six independent drawings of 256 layers to be worked on using a basic 512K-byte Amiga computer.

According to the vendor, full 16-color capability is available and drawings may be saved in the Amiga's standard IFF file format for use in other programs.

Aegis Draw Plus is controlled by either a mouse and pull-down menus or with the keyboard.

Other attributes include ruler lines with variable measure types; adjustable grid sizes; unlimited zoom levels; parts library for storage of often-used objects; and plot spooling.

Aegis Draw Plus costs \$259.95.

Aegis Development, #227, 2210 Wilshire Blvd., Santa Monica, Calif. 90403.

Spot Systems, Inc. has introduced **The International Teller System**, the sixth in its series of International Finance Systems for the IBM Personal Computer and compatibles.

The software is said to automate the teller station by providing for the issuance and purchase of drafts, the buying and selling of foreign currencies and travelers' checks and the sale of outgoing wires.

The International Teller System may be integrated with Spot System's Foreign Exchange Trading System and Multicurrency General Ledger products. It also contains features for support of transactions created by downstream correspondents, fee tables based on the originating bank and individual teller passwords and balancing controls.

The International Teller System costs \$7,500.

Spot Systems, Suite 617, 690 Market St., San Francisco, Calif. 94104.

Qcad Systems, Inc. has announced Version 3.0 of its typesetting package, **Qgroff**.

Qgroff is a typesetting package designed for the Hewlett-Packard Co. Laserjet and Laserjet Plus printers. It is said to provide the capability to mix different fonts, align margins, center, underline, subscript and generate an index.

Version 3.0 allows users to format a document while filtering out the actual Laserjet command codes. Version 3.0 also runs on the Digital Equipment Corp. VAX/VMS systems in addition to the IBM Personal Computer family.

The PC version costs \$79.95. The VAX version costs \$295.

Qcad Systems, 3333A Octavious Drive, Santa Clara, Calif. 95054.

Software languages

Cogent Software, Ltd. has announced **Cogent Prolog** for the IBM Personal Computer and compatibles.

Cogent Prolog is an interpreter said to support the full Edinburgh Prolog syntax and more than 100 standard predefined predicates.

Features include binary file I/O, screen functions, user-programmable error handling, debugging and access to DOS and BIOS.

Cogent Prolog comes with a tutorial reference manual and sample artificial intelligence programs written in Prolog. It costs \$79.

Cogent Software, 21 William J. Heights, Framingham, Mass. 01701.

Ferrari Performance At Volkswagen Prices.



CSI-75, The HIGH PERFORMANCE TurboDOS System.

Are you looking for a way to stay ahead of the pack in today's business computer market? Commercial Systems Inc. has the winning answer for TurboDOS VARS and distributors. The CSI-75 is the perfect combination of power, performance and price. With its superior, multi-processor architecture the CSI-75 will handle up to 12 users per chassis without any sacrifice of speed or access time. And the CSI-75 won't leave you idling at the starting line when your customers are ready to expand their operations. With additional chassis our systems can expand to serve over one million user stations.

Since all users have the power of an individual, dedicated CPU (with up to a megabyte of RAM) at their command, total machine

throughput actually increases with each added station. Average access time remains a low 18 to 35 milliseconds. And with hard disks of up to 16 Gigabytes of storage, the CSI-75 offers more speed and storage than any competitive product. At the lowest cost per user!

The CSI-75 comes packaged with extensive software for even greater value. Included are the TurboDOS operating system, a multi-user database management system with a complete accounting package, and a powerful word processor designed to operate in a multi-user environment. With data communications equipment for inter-city and inter-regional networking and the ability to support printers of all types, the CSI-75 is the ultimate expandable business system.

If you need more data processing horsepower in your TurboDOS systems you need the CSI-75.

CSI, when we say computers, we mean business.

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TurboDOS is a registered trademark of Software 2000, Inc.

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NEW PRODUCTS/MICROCOMPUTERS

Software utilities

Intelligenceware, Inc. has announced **Expertech-II**, an expert-system product for the IBM Personal Computer.

Expertech-II is a guide to expert system technology. It consists of an integrated collection of expert system tutorials, case studies, on-line and interactive teaching programs, expert-system building tools with source code, sample expert systems and artificial intelligence languages.

Users are said to be able to build their own expert systems and experiment with a variety of artificial intelligence tools and languages on the PC.

Expertech-II costs \$475.

Intelligenceware, Suite 730, 9800 S. Sepulveda Blvd., Los Angeles, Calif. 90045.

C-Level Software Development, Inc. has announced **FM plus**, a desktop utility package.

FM plus includes a full-feature menu manager, an appointment calendar with alarm and file manager. Features include a time tracker, a background print and print queue manager, global file search and multiple file and directory commands.

The memory resident program runs under Microsoft Corp. MS-DOS or IBM PC-DOS Version 2.0 or higher. It costs \$160.

C-Level Software, P.O. Box 128, Cypress, Texas 77429.

The Software Factory, Inc. has announced **Opal**, a personal computer-based programmer productivity tool.

Opal is a batch executive interpretive language said to integrate itself with DOS and applications running under DOS, providing the application developer with control over DOS applications.

Other features include screen and menu definition; flow-of-control; CALLS; DO groups; I/O operations; DATE manipulation; string manipulation; and disk, file, directory and system functions.

Opal is priced at \$169.

The Software Factory, Suite 750 LB44, 15301 Dallas Pkwy., Dallas, Texas 75248.

Software enhancements

Office Solutions, Inc. has announced **Officewriter 5.0**.

Features in the latest release include the abilities to view up to 15 columns on-screen, create line and box drawings, outline documents, create indexes, number paragraphs and search and sort documents.

Other features include a 40,000-word thesaurus, five-function math and automatic hyphenation.

Officewriter 5.0 is priced at \$495. Office Solutions, 2802 Coho St., Madison, Wis. 53713.

Strategic Software Planning Corp. has announced **Version 2.5** of its **Promis** project management integrated system.

Version 2.5 features improved subnetworking capability, faster sorting, enhanced on-screen reporting, increased what-if analysis flexi-

bility and enhanced graphics adapter support.

The improved subnetworking allows top-down or bottom-up creation of subprojects to merge projects or to create summary-level reporting capabilities. Sorting now offers a wild card selection.

Promis runs on IBM Personal Computer XT's and AT's and costs \$2,995.

Strategic Software Planning, 245 First St., Cambridge, Mass. 02142.

Brightbill-Roberts & Co. has announced **Show Partner 2.0**, an enhanced version of its personal computer-based software.

Show Partner allows a user to create computer-controlled presentations for training, informing, advertising, marketing and demonstrating. Version 2.0 is composed of four programs. The Show runtime module now allows the user to display the same script on the IBM Color Graphics Adapter and the Hercules Computer Technology, Inc. Monochrome Adapter without modification.

Show Partner 2.0 comes bundled with Microsoft Corp.'s Microsoft Mouse 6.0. It costs \$79.

Brightbill-Roberts, Suite 421, 120 E. Washington St., Syracuse, N.Y. 13202.

Communications

Control Division of Control Systems, Inc. has announced the **Smart Hostess**, an intelligent communications controller said to be IBM Personal Computer bus-compatible.

The board contains its own microprocessor and will act as the front-end processor for serial communications. It can utilize the PC AT I/O channel signals, allowing 16-bit memory transfers, and provides four or eight serial channels, of which two can be synchronous.

Other features include a maximum asynchronous data rate of 76.8K bit/sec. and a maximum synchronous data rate of 1.22M bit/sec.

An eight-port RS-232C with 256K bytes of dynamic random-access memory and 32K bytes of erasable programmable read-only memory costs \$1,495.

Control Division, 2675 Patton Road, St. Paul, Minn. 55113.

Data storage

Chorus Data Systems, Inc. has enhanced its **Color Photobase** application package by providing optical disk support.

Color Photobase is said to merge real-life pictures with data base management systems such as Ashton-Tate's Dbase II and III, Microrim, Inc.'s Rbase 4000 and 5000 and the IBM Filing Assistant.

A complete Color Photobase Workstation includes computer, video digi-

tizer, graphics card, optical and hard disk drives and display monitor. It is priced from \$15,393.

Chorus Data Systems, P.O. Box 370, 6 Continental Blvd., Merrimack, N.H. 03054.

Cipher Data Products, Inc. has introduced the **Cipher 5230**, a ¼-in. tape backup system for all models of the Digital Equipment Corp. Pro line of microcomputers.

The backup system is said to allow DEC Pro users to backup Winchester disk drives. It consists of a Cipher Floppy Tape ¼-in. backup module including chassis and power supply, a controller board, a chassis adapter box and backup software.

Continued on page 90

Now backup files on any media in just minutes.

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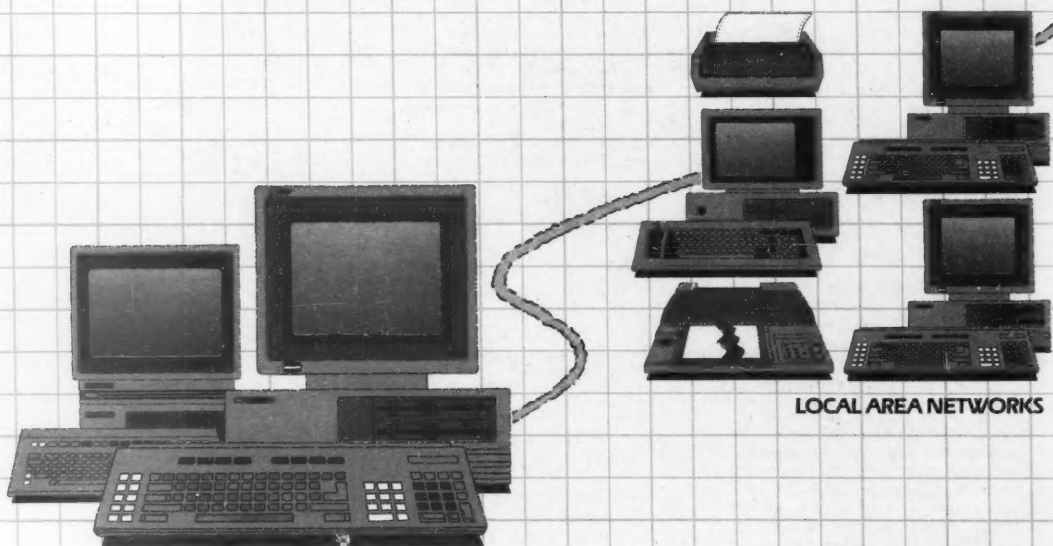
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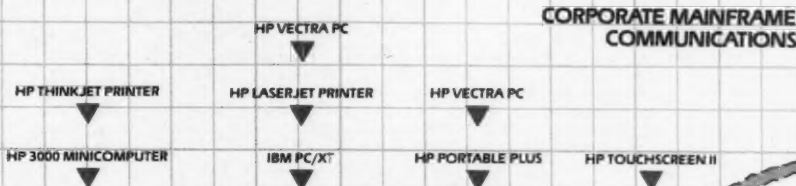
▲
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IBM PC/XT

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HP COLOR PLOTTER

▲
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HP TOUCHSCREEN

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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 87

The 5230 Floppy Tape system provides 25M bytes of backup.

The 5230 costs \$1,495.
Cipher, P.O. Box 85170, 10101 Old Grove Road, San Diego, Calif. 92138.

Printers/Plotters/ Peripherals

Centronics Data Computer Corp. has added Hewlett-Packard Co. Laserjet Plus emulation to its Pageprinter 8 laser printer.

This emulation is said to increase the printer's ability to support downline load capability of the fonts. It also allows software-selectable printing in either portrait or landscape mode and permits the intermixing of multiple fonts on a single page.

The Centronics Pageprinter 8 is priced at \$2,295. The HP Laserjet Plus emulation board is priced at \$250 and requires an expansion memory option priced at \$500.

Centronics, One Wall St., Hudson, N.H. 03051.

Hewlett-Packard Co. has announced the HP Quietjet printer, the narrow-carriage version of the HP Quietjet Plus printer.

The HP Quietjet printer offers 48 char./sec. printing for near-letter quality and 192 char./sec. printing for draft documents. It supports graphics resolutions of 96-by-96 dot/in., 192-by-96 dot/in. and 192-by-192 dot/in. The printer features both RS-232C serial and Centronics parallel I/O interfaces and works with most personal computers, terminals and software. It supports six different print pitches and has several resident character sets and graphics.

The HP Quietjet printer costs \$599.

Hewlett-Packard, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

Board-level devices

Intelligent Graphics Corp. has announced Cadcard Model 1040, a graphics controller for IBM Personal Computers and compatibles.

The Cadcard is said to feature an Intel Corp. 80186 CPU with 512K bytes of memory dedicated to storing the emulating microcode for IBM's color graphics and professional graphics controller. The card features a graphics accelerator.

The Cadcard Model 1040 costs \$1,750.

Intelligent Graphics, 2680 Bayshore Frontage Road, Mountain View, Calif. 94043.

DBM, Inc. has introduced the Magna-3/Multi-Scan graphics adapter for the IBM Personal Computer and compatibles.

The Magna-3 is said to be a full-featured high-resolution board. It is said to provide support for more than 256 types of color and monochrome monitors including the IBM Color Display and Enhanced Display and the Sony Corp. CPD 1302.

The board features resolution of up to 1,024 by 760 pixels and includes multifunction features such as two serial ports and a parallel port.

The Magna-3 costs \$1,095 to \$1,595.

DBM, 634 Georgia Ave., Palo Alto, Calif. 94306.

Newer Technology has introduced Attention, a dynamic random-access memory (RAM) packaged extended memory board for IBM Personal Computer ATs and compatibles.

Users can place four Attention boards in AT expansion slots and access the entire 15M bytes of upper memory, the vendor said. Attention supports 16-bit word access. It runs at 6, 8, 10 and 12 MHz with 6- and 8-MHz versions switchable to run at one wait state or zero wait state. Standard software for Attention includes Lotus/Intel/Microsoft Expanded Memory Specification software for expanded memory compatibility; print spooler; and RAM disk.

Attention, complete with 4M bytes of memory, costs \$995.

Newer Technology, 251 Whittier, Wichita, Kan. 67207.

Auxiliary equipment

Digital Communications Associates, Inc. has announced Aleckey, a keyboard said to provide IBM System/34, 36 and 38 users with the functionality of both an IBM 3179/80 terminal keyboard and an IBM Personal Computer keyboard.

Aleckey is said to include all of the keys found on both an IBM 3179/80 keyboard and a PC keyboard. The keys are labeled with the functions they perform. Aleckey can also be remapped by the vendor's Smart Alec emulation software to function like the 3179/80 terminal keyboard.

Aleckey is compatible with IBM PCs using the old BIOS as well as the new extended BIOS. It costs \$349.

Digital Communications Associates, 1000 Alderman Drive, Alpharetta, Ga. 30201.

ICS Computer Products has introduced the UDM-PC ultrasonic distance measurement board for use with IBM Personal Computers and compatibles.

The board is said to measure the distance to target objects using a remote transducer. Distances between five inches and 35 feet can be measured. A software-programmable range window provides target discrimination by distance.

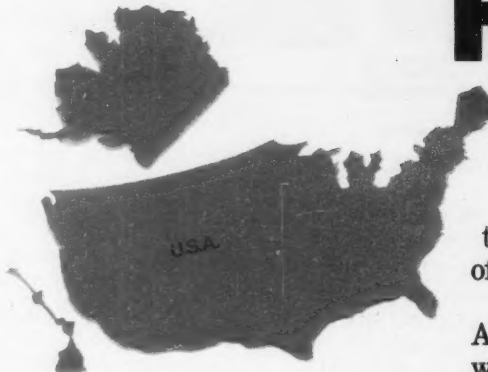
A hardware local mode provides a stand-alone maintenance range-testing feature.

The board requires one expansion slot. Expansion up to 14 channels is possible using external multiplexing options.

The UDM-PC costs \$695.

ICS Computer Products, Suite 208, 5466 Complex St., San Diego, Calif. 92123.

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NEW PRODUCTS/COMMUNICATIONS

COMMUNICATIONS

Communications controllers

Local Data, Inc. has announced **Datalynx/3174**, a 16-port cluster controller connecting asynchronous networks, personal computers, terminals and printers to IBM 3270 main-frame computers.

Datalynx/3174 is said to emulate IBM's System Network Architecture 3174, 3274 and 3276 control units. Users can mix and match IBM and asynchronous terminals throughout the network. **Datalynx** is said to be able to transfer and control up to 32 simultaneous data streams.

A four-port unit costs \$3,000. A standard 16-port unit costs \$6,000.

Local Data, 2771 Toledo St., Torrance, Calif. 90503.

Apollo Computer, Inc. has introduced the **Domain/Bridge G703**, a communications product designed to extend the functionality of the Domain System across high-speed European long-distance communication services.

According to the vendor, it allows European users to connect dispersed Domain workstation networks and maintain advanced services such as the Domain networkwide single-file system for resource sharing.

The **Domain/Bridge G703** costs \$14,250.

Apollo Computer, 330 Billerica Road, Chelmsford, Mass. 01824.

Distributed Logic Corp. (Dilog) has introduced the **CQ1620** eight-channel asynchronous communica-

tions controller designed for use with Digital Equipment Corp. Q-bus computers.

The controller is contained on a single dual-size circuit board. According to the vendor, it features larger transmit buffers on each channel that permit higher throughput between the CPU and peripheral devices. It runs standard DEC DHV11 driver and diagnostics software and provides full-duplex communications capabilities at data transfer rates from 50 to 38.4K bit/sec.

The **CQ1620** costs \$1,100.

Dilog, P.O. Box 6270, 1555 S. Sinclair St., Anaheim, Calif. 92806.

Voice/data communications

Granite Systems has introduced **Televox-1000**, a microcomputer-

based voice response system said to take incoming telephone calls and initiate outgoing calls.

According to the vendor, the **Televox-1000** acts as an intelligent interface between a host computer and telephone lines. It maintains a lexicon of sentence fragments and words that are retrieved to construct appropriate questions or answers.

The **Televox-1000** is priced from \$20,000 for a two-line configuration.

Granite Systems, 3732 Mt. Diablo Blvd., Lafayette, Calif. 94549.

Software

Tekelec, Inc. has introduced **X.75** software for its Chameleon II and 32 protocol simulator and analyzers.

The software is said to ensure high-quality X.75 implementation and performance of X.75 interfaces. Users can test station terminating equipment to verify its performance operating under the procedures recommended by the Consultative Committee on International Telephone and Telegraph.

The product costs \$2,000.

Tekelec, 26540 Agoura Road, Calabasas, Calif. 91302.

DA Systems, Inc. has announced the **Isobridge, Hub and Node** software packages for its Dasnet Wide Area network.

Dasnet is a distributed peer-to-peer network of IBM Personal Computers, ATs and compatibles. The software packages run on its QNX multiuser, multitasking operating system, IBM PC-DOS or Microsoft Corp. MS-DOS.

The **Hub** option allows computers running **Node** software to become accessible through the **Dasnet** network. Prices range from \$39.95 to \$1,390.

DA Systems, 1503 E. Campbell Ave., Campbell, Calif. 95008.

Emulex Corp. has introduced the **Net41**, a switching option for its CS41 T1 multiplexer.

The **CS41** with **Net41** is said to be a Digital Equipment Corp.-compatible asynchronous multiplexer with multihost access capabilities. The **Net41** supports up to 143 users distributed between the six DEC VAX host computer systems with no external switching hardware required.

The unit occupies a single hex-sized slot and features 50,000 char./sec. throughput.

The **Net41** software costs \$1,000. The **CS41** multiplexer with one 24-line distribution panel and switching firmware costs \$5,500.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

Multiplexers/Modems

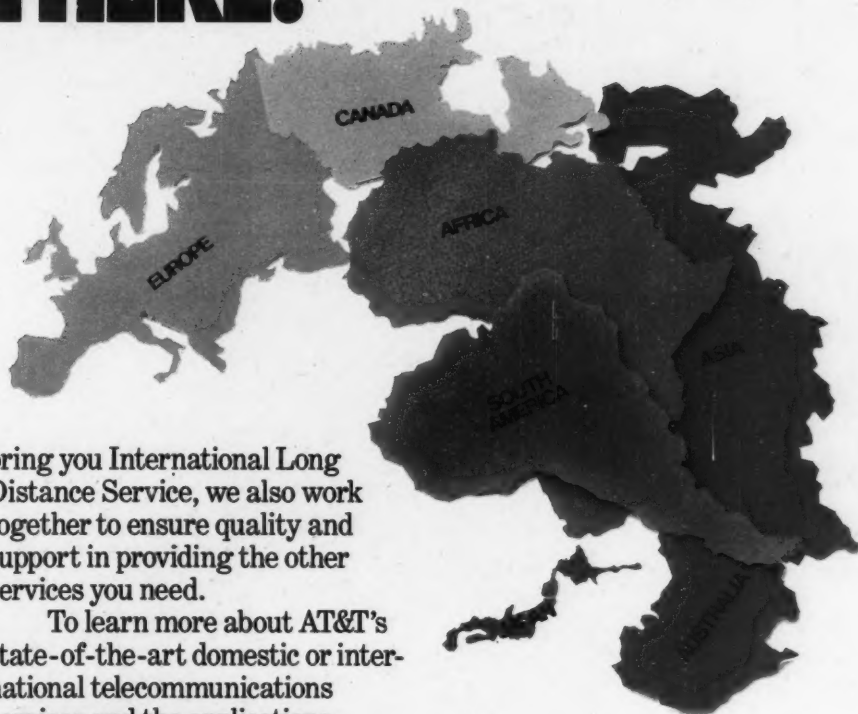
Artel Communications Corp. has announced the **LS250**, a device designed for users of Gould, Inc. 984 and 584 series programmable controllers.

The **LS250** is said to be able to send data between the Gould remote I/O stations and the Gould programmable controller. The **LS250** includes link diagnostics from either end and a switch that permits adjustment for short- and long-range applications.

The **LS250** costs \$1,050 per end.

Continued on page 94

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by resting on what's behind.



Somewhere along the way, a leader has to break away from the pack. And go it alone. That's what leadership is all about. Standing up, bearing down, and moving ahead.

Breaking Away.

Novell broke out of the local area networking (LAN) pack four years ago with the introduction of the file server. We called it a LAN milestone. Others scoffed. Three years later, when IBM announced that its LAN systems would be file server-based, the rest of the pack finally headed for that first milestone.

But Novell was already milestones ahead. By porting the NetWare® LAN Operating System to over 30 major LAN hardware systems and offering nearly 4,000 NetWare-compatible multiuser applications, Novell had established a de facto LAN standard. A standard now supported by more than 400,000 NetWare users worldwide.

And with the introduction of System Fault Tolerant (SFT™) NetWare, Novell passed another LAN milestone: affordable fault tolerance for nearly all LAN systems.

Moving Ahead.

Today, Novell isn't resting. On past achievements or anything else. While other companies are struggling to reach Novell's LAN milestones, Novell is forging an even bigger lead with new milestones like the Universal Network Architecture (UNA) strategy and the opening of NetWare Centers worldwide. A lead so big that many major LAN competitors are buying Novell technology just to stay in the race.

Being a leader is hard work. But Novell is in front to stay. Because nothing compares to the view from the front. Especially when you look forward to the milestones ahead.

 **NOVELL**
Milestones Ahead.

NEW PRODUCTS/COMMUNICATIONS

Continued from page 91

Artel Communications, P.O. Box 100, West Side Station, Worcester, Mass. 01602.

■

Scitec Corp. U.S.A. has announced its **Saturn D4** advanced T carrier modem.

The modem is said to operate between NRZ data equipment and North American terrestrial DS1 services. It uses AT&T services at 1.544M bit/sec. and provides subrates of 768, 384, 256, 192, 128 and 64K bit/sec. for clear channel conferencing. It provides line, local and remote loopbacks and comes equipped with a 37-pin female D RS-422/499 connector and an MS34 connector for V.35.

The Scitec Saturn D4 advanced T carrier modem costs \$3,500.

Scitec, 850 Aquidneck Ave., Middletown, R.I. 02840.

Local-area networks

Corvus Systems, Inc. has announced **PC/NOS**, a network operating system for its Omninet local-area network.

PC/NOS is said to allow networks to be created without file servers. Features include file-server support of the IBM PC-DOS 3.1 file, record locking calls and access security control for nodes, peripherals and files. PC/NOS can support multiple servers when necessary and permits the sharing of all resources that are available on the network.

PC/NOS is priced at \$695 for 64 users.

Corvus, 2100 Corvus Drive, San Jose, Calif. 95124.

■

Proteon, Inc. has announced the **P1680**, a network interface for Gould, Inc.'s Selbus-based Powernode and Concept/32.

The board connects to the Selbus via Gould's high-speed data interface II (HSD II) to provide access to the Pronet-80, an 80M bit/sec. token-ring local-area network. The P1680 Gould Selbus Host Interface costs \$2,900. A diagnostics package for the interface costs \$250.

Proteon, Two Technology Drive, Westboro, Mass. 01581.

Test equipment

Navtel, Inc. has announced the **X.25 Application Pack** for the Dataquest 5 field service protocol analyzer.

The X.25 pack is said to allow users to monitor X.25 packet-switching networks, decode frame and packet level activity and collect statistics. More than 75 tests and measurements are supported, the vendor said. The X.25

pack intercepts network activity and explains what is happening. It provides a full decode to the packet level.

The X.25 application pack costs \$175. The Dataquest 5 costs \$4,995.

Navtel, Suite 190, 6611 Bay Circle, Norcross, Ga. 30071.

■

Test & Measurement Systems, Inc. has announced the **LRR-101** remote program-

ming and data retrieval unit.

The unit is said to provide instantaneous information on signal strength in satellite communication systems. It operates in conjunction with the vendor's LRF-102 fading analyzer. It provides instantaneous programming of the remote unit and real-time monitoring. The product is also said to allow users to dial up any remote location for printouts for signal information.

The LRR-101 costs \$8,700.

The LRF-102, including RS-232 and GPIB interfaces, costs \$16,900.

Test & Measurement Systems, 2934 Corvin Drive, Santa Clara, Calif. 95051.

■

Intelco Corp. has introduced the **611**, a T1 handheld bit-error rate pattern analyzer.

The 611 is said to automatically synchronize on all T1 patterns received. It al-

lows users to perform bit-error rate analysis in remote field sites when a bit-error rate signal source can be generated and transmitted from a central facility, according to the vendor.

Analysis can be made with the 611 on standard QRSS patterns, fixed repeating patterns or live data traffic, the vendor said.

The Intelco 611 is priced at \$3,950.

Intelco, 8 Craig Road, Acton, Mass. 01720.

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NEW PRODUCTS/SYSTEMS & PERIPHERALS

SYSTEMS
& PERIPHERALS

Turnkey systems

Tektronix, Inc. has announced a version of its **PCB Worksystem** product for the enhanced Apollo Computer, Inc. DN3000 workstation.

The PCB Worksystem offers schematic capture, board layout and optional simulation with the Hilo-3 logic-simulation system, the

vendor said.

According to the vendor, the DN3000-based PCB Worksystem standard configuration includes 4M bytes of main memory, a 155M-byte hard disk, keyboard, mouse, the Aegis and University of California at Berkeley Unix Version 4.2 operating systems and Tektronix PCB design and layout software.

Prices start at \$49,900.

Tektronix, 5302 Betsy Ross Drive, Santa Clara, Calif. 95054.

Processors

Philips and Signetics Microsystems has added the **PG2030 VMEbus Processor**, the **PG2260 Memory module** and **PG2210 Dynamic RAM module** to its VMEbus Module line.

The modules are said to provide the basic computing nucleus for single- and multi-processor configurations in real-time industrial, data communications and instrumentation applications.

The PG2030 is priced from \$1,800; the PG2260 Memory module costs \$975 and the PG2210 is priced from \$1,700.

Philips and Signetics, M/S27, P.O. Box 3409, 811 E. Arques Ave., Sunnyvale, Calif. 94088.

Graphics systems

Gamma Electronics Systems Corp. has announced the Gamma stand-alone controller for color display.

The Gamma controller is said to allow a mix of different-size monitors and various keyboards producing color graphics terminals to be custom fitted to end user and OEM requirements. The Gamma controller features 14 emulation options including both Digital Equipment Corp. and Tektronix, Inc. resolution of up to 800 by 240 pixels and 16 colors from a palette of 4,096.

Pricing for the Gamma controller starts at \$900.

Gamma Electronics Systems, 6175-W Shamrock Court, Dublin, Ohio 43017.

Data storage

Cambex Corp. has announced a **quick-disconnect option** for its Certainty 810 Series streaming tape system.

The option is said to allow users to remove the backup unit from their IBM Series/1 rack enclosure and ship it to repair sites.

The option is priced at \$125. The Cambex Certainty 810 Series streaming tape system costs \$5,425.

Cambex, 360 Second Ave., Waltham, Mass. 02154.

California Peripherals Corp. has introduced a series of **1/4-in. streaming tape drives** that provide 60M bytes and 125M bytes of formatted storage.

The drives, designated Models CP-60 and CP-125, fit the half-height 5 1/4-in. floppy disk drive form factor. The CP-60 has nine recording tracks with a density of 8K bit/in. and 60M bytes of formatted storage.

The CP-125 has 15 tracks with a density of 10K bit/in. and 125M bytes of formatted storage.

The CP-60 costs \$650. The CP-125 costs \$850.

California Peripherals, 19701 S. Vermont Ave., Torrance, Calif. 90502.

Terminals

DY-4 Systems, Inc. has introduced the **SVME-676**, a VMEbus-compatible alphanumeric CRT controller with serial and parallel I/O, a timer and a real-time calendar clock with battery backup.

The CRT controller function is said to provide RS-170 output with nonserrated vertical synchrony for alphanumeric display.

According to the vendor, it acts as the interface between a CPU and a raster-scan CRT display.

Other features include software-selectable screen formats, a programmable cursor and programmable cursor blink rates.

The SVME-676 costs \$1,690.

DY-4 Systems, Suite 202, 1475 S. Bascom Ave., Campbell, Calif. 95008.

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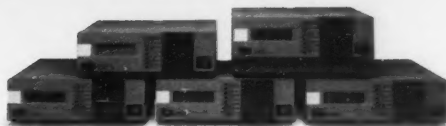
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don't want my
parking place!

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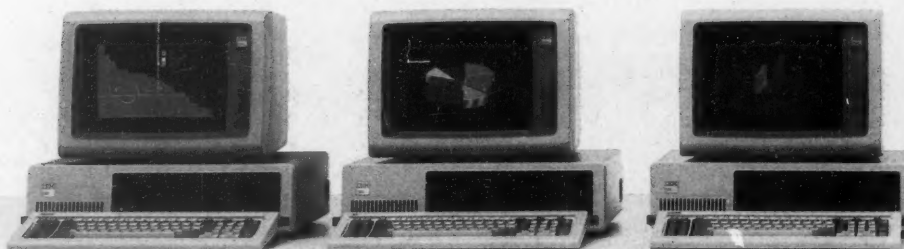
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NEW PRODUCTS/SYSTEMS & PERIPHERALS

Mitsubishi International Corp. has introduced the **Grafnet-02** digitizing tablet for graphics or computer-aided design and engineering input.

The tablet has an active area of 13 by 16½ in. It is supplied with a four-button cursor puck, a wall plug DC power supply and a 5-ft data cable terminated in a D-9/F connector, for coupling to an IBM Personal Computer AT-compatible serial port. Data output is via a standard RS-232 interface.

The Grafnet-02 digitizing tablet costs \$595.

Mitsubishi International, 520 Madison Ave., New York, N.Y. 10022.

Printers/Plotters

Centronics Data Computer Corp. has announced the **Linewriter 855T**

and **1200T** Tempest printers.

The Tempest products are configured to provide tamper-proof security by preventing the escape of radio frequency and electromagnetic emanations from information processing equipment.

The 855T and 1200T Linewriters are said to perform at speeds of 800 and 1200 lines/min, respectively. The Model 855T is equipped with an acoustical cabinet rated at 55dBA.

The Model 855T is priced at \$14,500, and the Model 1200T is priced at \$16,900.

Centronics Data Computer, One Wall St., Hudson, N.H. 03051.

Autoplot features a 16-bit processor and a 256K-byte buffer, expandable to 1M byte. It is said to be able to draw on any flat material regardless of size or thickness.

Other features include Hewlett-Packard Co.'s HPGL command set and dual pass-through RS-232C ports, which permit a second peripheral to share a computer interface.

Autoplot costs \$4,495 with one pen and a 256K-byte input buffer. The 1M-byte input buffer option costs \$400. The eight-pen option is \$500.

GTCO, 7125 Riverwood Drive, Columbia, Md. 21046.

Eastman Kodak Co. has announced the **Komstar** systems manager printer for use with its Komstar

imaging system.

The printer is said to allow users to output mailing labels and print information contained in the unit's systems manager. The printer enables hard copy printouts to be obtained from the data stored in the systems manager.

The Komstar systems manager printer is priced at \$1,420.

Eastman Kodak, 343 State St., Rochester, N.Y. 14650.

Power supplies

RTE Deltec Corp. has introduced a rack-mount version of its **7000 Series Uninterruptible Power System** product line.

The rack-mount systems are said to assure on-line, regulated, continuous AC power for computers and other critical equipment in the 3KVA power range. The systems fit into standard 19-in. equipment racks and operate at 60Hz with 120V input. They provide 120V output to the critical load.

The 7000 series rack-mount models cost \$5,195.

RTE Deltec, 2727 Kurtz St., San Diego, Calif. 92110.

Auxiliary equipment

ICS Computer Products, Inc. has announced the **ICS 1021 Touch Control Screen**.

The screen acts as an interface between users and computer-driven systems. It interprets character strings from the host computer and acts as a software-configured control panel.

The ICS 1021 can be mounted into a panel or rack or on a tabletop. It is priced at \$1,795.

ICS Computer Products, Suite 208, 5466 Complex St., San Diego, Calif. 92123.

PRICE REDUCTIONS

Productivity Software International, Inc. has announced a price reduction for **PRD+**, its personal computer keyboard and macro enhancement program.

The program is said to increase typing and data entry speed by enabling users to enter a shorthand form of frequently used text. According to the vendor, it does not require commands that break a user's typing rhythm.

PRD+ is memory resident and runs on IBM Personal Computers and compatibles. It costs \$68.

Productivity Software International, 1220 Broadway, New York, N.Y. 10001.

Ampex Corp. has announced price reductions for its **Ampex 210 Plus** and **230 Plus** ASCII video display terminals.

The Ampex 210 Plus offers an 80- and 132-col. display, 14 programmable function keys and 400 bytes of nonvolatile memory. The Ampex 230 Plus features four 80-col. display pages, 16 programmable function keys and 6,000 bytes of nonvolatile memory. It offers emulation of the Wyse Technology, Inc. WY-50, Tele-video Systems, Inc. 910, 920/912 and 924/914.

The 210 Plus is priced at \$419, and the 230 Plus costs \$519.

Ampex, 401 Broadway, Redwood City, Calif. 94063.

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COMPUTER INDUSTRY

Section begins on page 122

Pansophic steps outside of traditional mainframe arena

Purchased number of products, firms in 1986

By Jean S. Bozman

OAK BROOK, Ill. — Last year was a hectic one for Pansophic Systems, Inc., as the suburban Chicago software systems house pursued a fast-paced series of acquisitions that added both new products and new corporate entities to the company.

The intent of the actions, said Chief Executive Officer David J. Eskra in a recent interview, is to enlarge the company beyond its traditional IBM mainframe environment, adding links to the minicomputer and microcomputer systems in growing corporate networks.

"The bulk of our business will continue to be with IBM systems," Eskra said, "but we would like to be able to provide software that can run in a variety of environments."

Porting to minicomputer environments

That means Pansophic will spend the balance of the 1980s learning to port its application development tools, like Telon, to Digital Equipment Corp. and other minicomputer environments. "If our productivity tools are quick, and our products are portable to other systems," Eskra said, "then it really won't matter what environment they are used in."

Through the flurry of 1986 additions, Eskra said Pansophic will grow to \$100 million in sales by the middle of this year and to \$200 million by the end of 1988. He said the company's larger size will help it compete with the industry's other acquisition-minded players — Computer Associates International, Inc., Management Science America, Inc. and Sterling Software, Inc.

In the past year, Pansophic generated \$80 million in software revenue

and intended to pay nearly as much for acquisitions. Pansophic was able to plan this growth based on cash reserves of \$62 million and \$150 million in assets. Some of the cash reserves came from two 1985 public offerings, which together raised \$42 million.

Acquisition canceled

The previously announced \$32 million acquisition of SPSS, Inc. was called off when the two companies could not come to terms [CW, Jan. 5]. SPSS is a Chicago-based supplier of statistical analysis and graphics applications software.

"The deal is off permanently," an SPSS spokesman said. "A number of things had to be agreed upon by the end of the year in order to take advantage of the 1986 tax law." SPSS intends to continue operations as a privately held company for the foreseeable future, the spokesman said.

Jim Hodges, senior vice-president of finance and administration at Pansophic, would not comment on what issues kept the two from consummating the deal, which was based on an October 1986 letter of intent. The merger, he said, would have added to both companies' profits and broadened both product lines. "But," Hodges added, "if you can't get something at the right price, then you have to walk away."

PCR largest purchase

Pansophic did not walk away from other acquisitions in 1986. Its largest purchase was the \$19 million December acquisition of Professional Com-

puter Resources, Inc. (PCR), an Oak Brook, Ill., provider of IBM System/38 turnkey systems. PCR will remain as a freestanding development organization, as will some of the other acquired companies.

PCR is expected to open new markets in mid- and small-size IBM shops, in which Pansophic had not had a substantial base. Pansophic developers hope to learn from PCR's experience in dealing with smaller IBM shops that use the System/38 in manufacturing and accounting applications.

Other Pansophic acquisitions in 1986 included micro-to-mainframe link supplier Remote Data Systems, Inc. in Brookfield, Wis., for an undisclosed amount and Fusion Products International, a San Rafael, Calif., supplier of System/36 and 38 system products, for \$7.2 million.

Acquired products included Starburst, a graphics package acquired from Audio Visual Laboratories in Tinton, N.J., D-pict, a graphics package acquired from British Petroleum Co., and Ingot, a decision support system acquired from Schonfeld & Associates, Inc., an Evanston, Ill., software house.

Reorganization

In order to better absorb its new businesses, Pansophic forged a line-of-business operation in late December, reorganizing into four divisions. Responsibility for the original Pansophic product line will be given to two divisions — systems life cycle products and productivity products.

A separate graphics products divi-

sion will sell Starburst and D-Pict, while a fourth division is composed of PCR's business.

Industry analysts have had mixed reactions to Pansophic's quest for greater size and a broader product line. Scott Smith of Donaldson, Lufkin and Jenrette said he believes that Pansophic has set itself a possible dream. "They have the cash to acquire these companies, and I'd rather see them spend it on acquiring good businesses than keeping it in the bank," Smith said.

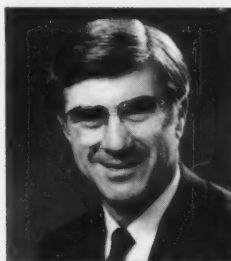
But others, like Terence Quinn, a vice-president and senior technology analyst with E. F. Hutton & Co., are concerned that the company may be spreading its resources too thin. "The acquisitions were not painless," Quinn said, "and some of Pansophic's primary product business has slowed."

Confidence in management

But Quinn expressed confidence in Pansophic's top management team, saying they are equal to the challenge of restructuring the company. "It's certainly possible that they could soon be doing \$200 million in business a year," he said. "But if they're building an addition, they'll have to make sure that, in doing it, the main section won't fall down."

Eskra said he remains confident, noting that by 1995, Pansophic should be positioned to help its present base, which consists of more than 9,000 IBM mainframe sites, cope with the array of minicomputers and micros scattered throughout their corporate networks. The concept of adding to Pansophic's product lineup, according to Eskra, was driven by end users.

"We'd like to think we're listening to our customers and their plans into the 1990s," he said, "and putting ourselves in a position to deliver products that address those needs."



Pansophic's David J. Eskra

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Growth seen in hardware

By Mitch Betts

WASHINGTON, D.C. — Revenue for the computer hardware industry will grow about 10% in 1987, while revenue for the software and services industry will grow about 11% to 12%, according to the recent annual forecast issued by the Computer and Business Equipment Manufacturers Association (CBEMA).

CBEMA's forecast noted that hardware industry revenue grew only 6.5% in 1986 to \$107.6 billion, a growth rate well below the average annual rate of 13.8% between 1975 and 1985.

Revenue for the software and services industry grew by 10.5% in 1986 to \$45 billion, the trade group said.

CBEMA expects only marginal gains for the telecommunications industry.

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COMPUTER INDUSTRY

IBM, Merrill Lynch to close Imnet financial services venture

By Alan Alper

NEW YORK — Management indecisiveness and an ill-fated product strategy caused the demise of International Marketnet (Imnet), the IBM/Merrill Lynch & Co. financial information services venture that will cease operations at the close of the first quarter.

The 22-month venture suffered from product delays and an inability to attract large Wall Street brokerage clients, observers said. In a terse statement, IBM and Merrill Lynch said the venture is being closed following a reassessment of its financial viability. Neither firm would elaborate on the decision to end the venture.

Wall Street sources said both firms had invested more than \$70 million in the venture. A Merrill Lynch spokesman, however, called that figure grossly overestimated and inaccurate.

Analysts and potential customers said Imnet's IBM Series/1-based distributed branch office system was too expensive, too complicated to use and offered more features and functions than brokers really required.

"It was overkill," noted Tom Lawton, editor of "The Computer Services Report," a Belmont, Mass., newsletter. "The idea that a broker is anything more than a telephone salesman is ridiculous. They don't know what to do with all that com-

puting power."

Merrill Lynch's participation in the venture also scared off brokerage houses that likened working with Imnet to dealing with the enemy. "Obviously, Merrill Lynch was a bigger drag on the venture than the two partners wanted to admit in the beginning," Lawton said.

Gary Fernquist, vice-president of Loomis Sales, Inc., an investment counseling firm that had considered evaluating Imnet's products, said he wasn't surprised by the venture's demise. "They had a lot of competition and, in reality, were selling futures," he noted. "Their system would have cost plenty of money, and from what I hear, there were some questions

about management's ability to make decisions."

Although rumors had persisted that Imnet was in trouble, the Merrill Lynch spokesman said neither partner had sought to bring another corporate investor into the partnership. "We were trying to market to other brokerage houses and institutions," the spokesman said, "not bring in other partners."

An IBM spokesman would only say that both partners had explored various options to keep Imnet viable. He declined to say what those options were.

The 31 employees Merrill Lynch and IBM had contributed to the venture will rejoin their respective firms. Approximately 230 unattached workers will be laid off, receiving a severance package including salary and benefits through May 8.

Imnet's assets will be divided between the partners, both firms said. The software Imnet used will revert back to Merrill Lynch, where it was developed, the firm noted.

The Merrill Lynch spokesman said the firm has not determined how it will use its technology. It had intended on using Imnet systems internally for its 10,000 account executives. Merrill Lynch currently uses Quotron Systems, Inc.'s financial information services under an agreement that runs until 1988.

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Apollo plans to enter AI arena

By Rosemary Hamilton

CHELMSFORD, Mass. — Intending to make a major push into the artificial intelligence arena — an area recently targeted by major workstation vendors — Apollo Computer, Inc. last week inked pacts with two of the dominant players in the AI software market, Teknowledge, Inc. and Intellicorp.

The agreements call for Apollo and the software vendors to jointly market systems based on the full range of Apollo hardware. Teknowledge is scheduled to provide its S.1 and M.1 software, and Intellicorp is slated to offer its Knowledge Engineering Environment product.

Olivetti licenses Orion facility

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LU6.2 and PU2.1 peer-to-peer communications packages that would enable Olivetti systems to participate as peers in a Disoss network.

Olivetti, the second largest computer supplier in Europe, is the second European manufacturer to license Orion's IBM Systems Network Architecture-based software. Orion announced a similar contract with Philips International in the Netherlands last September. Orion's other clients include Apple Computer, Inc. and Banyan Systems, Inc.

COMPUTER INDUSTRY



MERGERS AND ACQUISITIONS

AT&T and Ford Aerospace & Communications Corp. announced that AT&T had agreed to acquire 100% of the stock of a Ford Aerospace subsidiary, the **Ford Aerospace Satellite Services Corp.** (FASSC), for \$2.7 million in cash and other considerations.

Concurrently, the two companies asked the Federal Communications Commission to transfer to AT&T an authorization held by FASSC to build, launch and operate two new communications satellites. FASSC has held the authorization since July 1985.

Unisys Corp., the merger of the former Sperry Corp. and Burroughs Corp., and **Hercules, Inc.** announced that **Hercules Aerospace** will acquire the Sperry Microwave and Systems Support Operations of Unisys for \$42 million in cash.

Located in Clearwater, Fla., the Sperry operation is a supplier of guidance systems, certain electronic warfare products, automatic test systems and other specialized systems based on radio frequency technology. The Microwave and Systems Support division currently employs approximately 1,000 workers.

Ross Systems, Inc. and **Virtual Microsystems, Inc.** in Berkeley, Calif., announced that they are merging the two companies to form **Rossdata Corp.**

Rossdata, with estimated combined sales of more than \$17 million, will concentrate in Digital Equipment Corp. VAX applications and services software as well as VAX-to-IBM Personal Computer communications products. Both firms will continue to exist as operating companies, while Rossdata will provide overall management support.

Intel Corp. and **Memtech, Inc.** have signed a letter of intent outlining the sale of Intel's magnetics operation to Memtech.

The letter of intent details an agreement whereby Memtech, a recently formed company, may buy certain assets and inventory related to Intel's magnetic bubble memory business for an undisclosed price.

In October 1986, Intel announced that it would phase out the magnetics operation, responsible for the company's bubble memory product line, as the company focused on other product technologies.

Baron Data Systems Co., a supplier of computer systems for the court reporting, medical and legal markets, signed a letter of intent to purchase **Software Technology, Inc.**, a Lincoln, Neb.-based developer of the software package Tabs III.

The purchase expands Baron's ability to penetrate the microcomputer-based legal systems market.

Software Technology is a vendor of microcomputer software systems for law offices. Currently, the company has more than 2,200 installations.

V-Band Systems, Inc. has agreed in principle to acquire **CP International, Inc.** and its U.S. and UK sub-

sidaries, suppliers of video and digital switching systems to the financial service industry, for approximately \$8 million cash plus an additional contingent amount based upon CP International's financial results for the year following the acquisition.

Zentec Corp. announced that it has sold its service and maintenance operations to **Dow Jones & Co.** for an undisclosed cash price.

Zentec's service operations include the service and maintenance operations of the data products division of **Lear Siegler, Inc.**, which was recently purchased by Zentec.

As part of the transaction, Zentec and Dow Jones have signed a five-year agreement under which Dow Jones, which provides maintenance on a wide range of electronic equipment through 76 service centers

across the country, will continue to provide warranty and maintenance service for Zentec products.

Santa Clara, Calif.-based Zentec designs, develops and markets intelligent terminals for OEMs and systems integrators.

Genicom Corp. has announced that an agreement has been reached with **Televideo Systems, Inc.** to acquire the printer-related assets of Televideo System's daisywheel business unit.

The transaction will be made for approximately \$3.24 million, payable to Televideo over five years.

Also, royalties that could exceed \$1.2 million during the five-year period will be paid to Televideo for printers that are sold above a stipulated base amount for each of the five years.

Southern Net, Inc. announced that it has entered into a merger agreement with **Mid-Atlantic Telecom of Virginia, Inc.**

Under the terms of the proposed merger, Mid-Atlantic would merge into **Southern Net Services, Inc.**, a wholly owned subsidiary of Southern Net.

Mid-Atlantic, a privately held corporation, has been a supplier of long-distance telecommunication services to companies in Virginia since 1984.

Jefferson-Pilot Data Systems (JDS) in Charlotte, N.C., and **Data Communications Corp (DCC)** in Memphis, announced that DCC would be acquired by JDS.

JDS, a division of **Jefferson-Pilot Communications Co.**, develops and markets in-house computer systems for radio and television.

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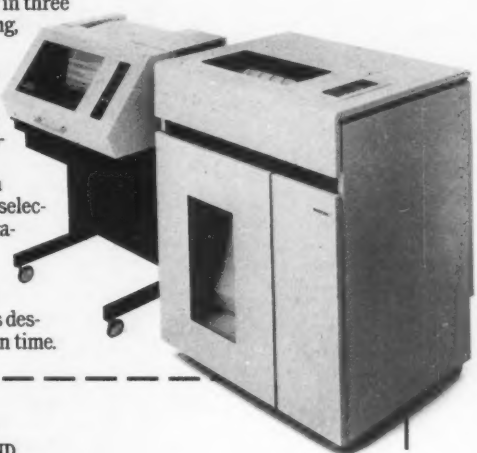
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COMPUTER INDUSTRY



EXECUTIVE CORNER

ADAPSO, the computer software and services industry association, has elected officers and directors for 1987. **Jay Goldberg**, chairman and chief executive officer of New York-based Money Management Systems, Inc., will be chairman of the ADAPSO board of directors.

David Eskra, vice-chairman and CEO of Pansophic Systems, Inc., will serve as vice-chairman. **John Courtney**, president of Computer Task Group, Inc., will serve as treasurer.

NCR Corp. announced the appointment of **R. Elton White** and **Gilbert P. Williamson Jr.** as executive vice-presidents and the appointment of **Warren A. Castay** as vice-president, Pacific Group. In addition, **Manuel Garcia**, executive vice-president and member of NCR's Executive Office, is retiring effective Aug. 1, 1987.

Control Data Corp. named three executive vice-presidents in a senior management realignment. **Thomas C. Roberts**, formerly president of Schlumberger Ltd.'s Fairchild Camera and Instrument Corp. unit, was named vice-president in charge of mainframes. He succeeds **Larry E. Jodsaas**, who becomes senior vice-president of quality and operations review. Jodsaas succeeds **Henry J. White**, who will retire in March. Also named vice-presidents were **Lawrence Pearlman** and **David P. White**.

Ronald L. Skates has been elected senior vice-president of finance and administration for Data General Corp. Skates replaces **Kenneth V. Jaeggi**, who left to pursue other busi-

ness opportunities.

Grid Systems Corp. announced the election of **John P. Morgridge** to the new post of president and chief operating officer. He will also join Grid's board of directors. Previously, Morgridge served as senior vice-president of marketing at Stratus Computer, Inc.

Samuel J. Wiegand, Grid's present chairman and president, will continue as chairman and chief executive officer of the company.

Teradata Corp. has appointed **Kenneth W. Simonds** chief executive officer. Previously, Simonds shared the chief executive duties with **Jack E. Shemer**. Shemer will now support corporate programs for financing, investor relations, strategic allowances and planning.

Autographix, Inc., a developer and manufacturer of presentation graphics systems and software and imaging services, announced the appointment of **Ken Draeger** as president and CEO. He is replacing **Thomas H. Conway**, who has served as interim CEO for six months. Draeger formerly served as chairman and CEO for Computer Corporation of America.

Mark Morley has joined Encore Computer Corp. as vice-president of finance, chief financial officer and treasurer. He is an attorney and CPA and will act as legal counsel to management.

Roger A. Phillips, president of Transform Logic Corp., has resigned to pursue other interests. His CEO duties will be assumed on an interim basis by a three-man executive committee consisting of Chairman **Garrett P. Melara**, who will also be appointed president, **Jan C. Koontz**, who will serve as chief operating of-

ficer, and **Thomas K. Yerkes**, who recently joined the company as vice-president of finance and administration.

James R. Risher has been named president and CEO of Exide Electronics Corp. in Raleigh, N.C. Previously, Risher served as senior vice-president and head of distribution operations at Motorola Computer Systems, Inc.

Tandem Computers, Inc. announced the promotions of **Robert F. Hoogstraten** and **Gerald D. Held**. Hoogstraten, former regional director in northern Europe and managing director for Tandem Computers Holland, was elected corporate vice-president and managing director of Tandem Computers Europe. Held, who was formerly director of new ventures, was elected corporate vice-president of new ventures.

Albert W. Moulton has been named president of Skok Systems, Inc. Moulton will take charge of Skok's corporate administration, concentrating on fortifying Skok's dealer distribution program.

James E. Williams, former vice-president and treasurer of Syntax Corp., has joined Masstor Systems Corp. as senior vice-president and chief financial officer and will become director of the company. He is replacing **Richard P. Beck**, who is resigning to pursue other business interests.

Rand Information Systems, Inc. announced that it has retained **Texas Infinity Corp.** to assist in restoring Rand to profitability. **F. Richard Sleavin Jr.** of Texas Infinity will become acting president and CEO of Rand, reporting to its board of directors.

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Ashton-Tate sues Migent

From page 122

dence that was developing, we thought it was necessary for us to take legal action in this case," said **Luther Nussbaum**, president of Ashton-Tate. Nussbaum declined to comment on what evidence was obtained or whether physical aspects of technology or product concepts were involved.

Migent disagreed. "There is no merit to the lawsuit. Ashton-Tate is a large company that is trying to hold on to their customer base," Gritzmaker said.

Historically, such suits have often been attempts by one firm to delay the entry of another into a particular market, observers noted, and are especially common in the computer industry because time to market is so crucial to a product's success.

Nussbaum denied that delaying a Migent product introduction was a key goal of the suit but admitted the suit does not refer to any products currently marketed by Migent.

Ratliff said he believes Ashton-Tate will succeed in delaying the introduction of Emerald Bay. "I think they are going to be successful. It is going to take a lot of my time talking to lawyers, making statements, gath-

ering information," he said.

When Ratliff left Ashton-Tate, he sold the Dbase technology to Ashton-Tate and had signed a three-year noncompete clause that expired last September. "In my own mind I carefully abided by the agreement," Ratliff said.

According to Ratliff, Ashton-Tate is determined to ward off any competition. "Ashton-Tate would always get extremely paranoid when a new competitor would enter the market," he said. "They would fly off the handle. When Ansa Software Co.'s Paradox came out, they were just panic stricken. I think the same thing is true with the product that I am working on now."

Codefendant in suit

Queue Associates, Inc., a Pacific Grove, Calif., consulting firm that designed software for Ashton-Tate, is a codefendant in the suit with Migent.

The charges against Queue are unclear. "Their principals were working under contract for development for Ashton-Tate at one time. Those products were never brought to market and are completely owned by Ashton-Tate," Nussbaum said.

He declined to comment on what Queue was developing for Ashton-Tate.

Queue principals could not be reached for comment. According to Migent, Queue is no longer in business.

Unisys withdraws from MCC

From page 122

not acquired.

At the end of 1985, BMC Corp., Mostek Corp. and Gould, Inc. announced their departures from MCC. Mostek sold its share to Westinghouse Electric Corp., BMC sold to Hewlett-Packard Co. and Gould has not found a buyer, Stotesbery said.

The departure of Unisys and others will have no effect on MCC's \$75 million 1987 budget, Stotesbery added. He said the departures represent change in the industries in which those companies compete and not dissatisfaction with MCC.

"Support from shareholders has been quite good, as we have raised the MCC budget from \$65 million to \$75 million," he said.

In an unrelated matter, Joseph Boyd, chairman of the board at Harris Corp., became MCC's interim chief executive officer effective Jan. 1. MCC's five-member committee is continuing its search to replace retired Adm. Bobby Inman, who chaired the fledgling consortium.

Stotesbery would not comment on potential candidates for the position. Inman announced in September that he would be leaving MCC [CW, Sept. 15]. His last day was Dec. 31.

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COMPUTER INDUSTRY

Inside buyers bid on firm's subsidiaries

By James A. Martin

NORCROSS, Ga. — Intelligent Systems Corp., which announced last fall it would sell its subsidiaries in an effort to increase the stock value of the company, has found several suitors from within the company.

Intelligent Systems directors and shareholders recently approved the sale of Intecolor Corp., a minicomputer graphics terminal manufacturer, to Intecolor's management and employees.

The transaction, valued at \$13 million, is composed of cash, notes and the sale of Intelligent Systems stock by Intecolor employees back to Intelligent Systems.

In addition, the management of Peachtree Software, Inc. is said to be negotiating to buy that subsidiary from Intelligent Systems. Peachtree

Software, which specializes in microcomputer software for small businesses, was purchased by Intelligent Systems from Management Science America, Inc. in 1984. Although Peachtree President William Goodhew confirmed that negotiations were ongoing, he would not elaborate.

Intelligent Systems announced last fall that it would be up for sale [CW, Oct. 6], and the company hoped to liquidate some assets before existing tax credits expired on Dec. 31. When that did not materialize, the company restructured itself as a master limited partnership to take advantage of new tax laws regarding the transfer of assets.

Intelligent Systems was formed in 1973 to sell minicomputer graphics terminals. After acquiring Quadram

in the early 1980s, the company spun off that business into the newly formed Intecolor division, according to Charles Muench, an Intelligent Systems founder and Intecolor investor. Intecolor is now owned mainly by top management and outside investors. Some 20% is owned by the company's 170 employees through a stock ownership plan.

In a related development, Asher Technologies President and Founder Wil Riner has departed to start his own company after an unsuccessful bid to buy Asher from Intelligent Systems.

In the meantime, however, Intelligent Systems has secured a temporary restraining order to prevent Riner's new firm, The Network Connection, from directly competing against Asher.

Japanese firms make sobering '87 resolutions

By Takehisa Kondoh

TOKYO — Leading Japanese high-tech vendors have urged employees to pay strict attention to the bottom line in order to survive continuing economic strife in 1987.

In a series of New Year's addresses by top executives of computer and electronics firms, workers were told that their companies would emphasize a reduction in costs, product viability and drastic corporate restructuring to restore overseas profitability, which plummeted last year.

Many vendors predicted that their sales in foreign markets will remain sluggish for the first half of 1987, as it seems unlikely that the Japanese

yen will soon drop in value against the U.S. dollar.

According to Katsushige Mita, president of Hitachi Ltd., a firm whose mid-year profits for 1986 slipped 55% from 1985 levels, "For Hitachi, 1987 has to be the year of comeback. We are looking for a new management culture and balanced overseas operations as well as learning to cope with the new foreign exchange climate."

Toshiba Corp. President Sugichiro Watari asked the company's 120,000 employees to focus on market-specific merchandising by increasing departmental collaboration. His goal is to boost Toshiba's domestic revenue share of markets includ-

ing computers, communications gear and semiconductors to 50% from its present 33%.

Mitsubishi Electric Corp., rivaling Hitachi and Toshiba as a full-line electronics manufacturer, will reportedly overhaul its overseas manufacturing operations and augment its profitable divisions such as office automation equipment.

Hitachi, Toshiba and Mitsubishi have been forced to redistribute their work forces with new emphasis being directed at communications, office automation, software and integrated circuits.

Kondoh is Asian bureau chief of the CW Communications International News Service.

IBM's shifting service strategy

From page 122

particular. This will become the key mechanism for generating both revenue and profit directly from service, as well as for controlling market share.

IBM's service strategy is designed to both preempt new third-party maintenance organizations and defend against the existing manufacturing service organizations that are attempting to penetrate the network services market.

The best manifestation of IBM's new service strategy is the array of specific service plans and programs offered by IBM in 1986. Last spring, IBM began to roll out its Enterprise Strategy on a limited basis.

Integrated program

This involved a marketing approach to IBM's top 50 to 75 major accounts, offering them an integrated network service program supported by both IBM and Rolm Corp.'s knowledge and capability.

Under the Enterprise Strategy, a low-key, low-profile approach, IBM began to offer price discounts for bundled integrated network services.

The specific enterprise strategy

was followed last summer by an offer of specific discounts for multi-year agreements. The effect of the multiyear approach was to lock in IBM service customers on a long-term basis by offering price discounts.

In October, 1986, IBM promulgated the Corporate Services Amendment (CSA), offering further discounts to customers who had installed a service management system in collaboration with IBM service.

This involved the creation of a network service coordination center and individual help desks. Organizations establishing such procedures and systems were offered significant price discounts.

The CSA created a centralized service procedure, under major customer account MIS control, that is highly oriented toward IBM service.

It further preempts third-party maintenance organizations from attempting to penetrate an IBM-controlled service base, since the independent cannot make use of the IBM help desk.

A deep discount

At the bottom line, IBM has created a deep service price discount of up to 40% — particularly for IBM Personal Computers on a stand-alone or network basis in large corporations.

Since IBM generally provides little service to micros, these major price discounts have a much greater economic impact on IBM's third-party micro service competitors than on IBM directly.

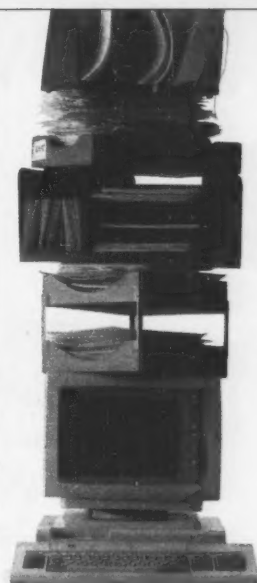
IBM has announced even more service price and quality improvements to be expected this spring and summer. Many corporate customers are eagerly awaiting these announcements before making any major service commitments to other vendors.

As IBM has proven before in other market segments, as a market becomes larger and the competition more aggressive, IBM can move strategically, with a sophisticated marketing and pricing approach, to take market control.

For IBM's competitors in service, the window of opportunity that existed at the start of the decade is now beginning to close.

If the independent service market is going to keep up competitively, then only sophisticated marketing and pricing approaches will prevail. Those service organizations that have attempted to survive and grow with a simple sales approach are now at great risk.

Every major service organization should seriously evaluate its business and marketing strategy and marketing and sales support plans in light of the new IBM service strategy.



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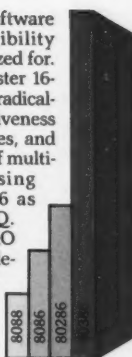
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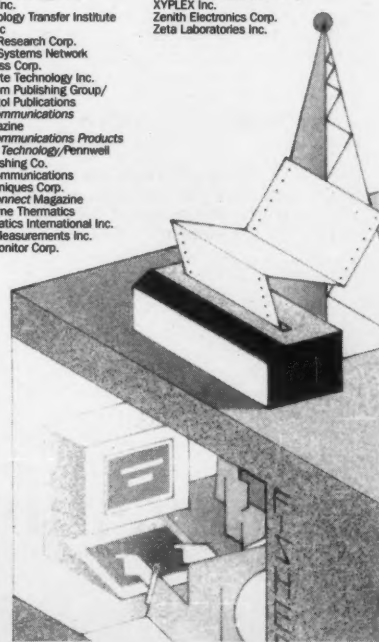
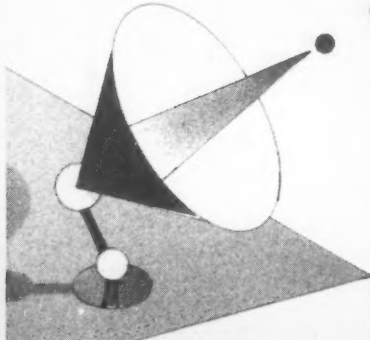
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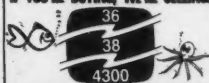
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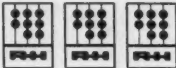
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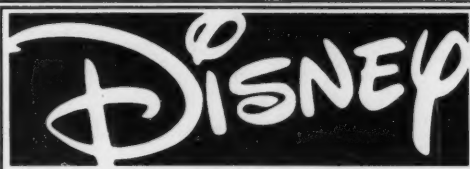
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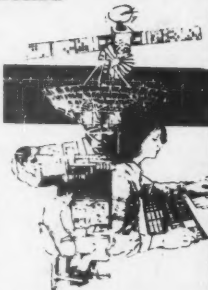
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MS Data Base Anal (279 yrs)	730-740K
MS Data Base Anal (281 yrs)	735-745K
MS Data Base Anal (283 yrs)	740-750K
MS Data Base Anal (285 yrs)	745-755K
MS Data Base Anal (287 yrs)	750-760K
MS Data Base Anal (289 yrs)	755-765K
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MS Data Base Anal (293 yrs)	765-775K
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MS Data Base Anal (339 yrs)	880-890K
MS Data Base Anal (341 yrs)	885-895K
MS Data Base Anal (343 yrs)	890-900K
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MS Data Base Anal (347 yrs)	900-910K
MS Data Base Anal (349 yrs)	905-915K
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MS Data Base Anal (353 yrs)	915-925K
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Qualified candidates will possess a Masters Degree in Mathematics, Computer Science, Management Information Systems or related field. Experience in a university student service unit such as registration and records, admissions, student financial aids. Experience with computerized data processing and management. Knowledge of an AS system is preferred. Salary range will be \$29,632 - \$32,808. Applications close February 27, 1987. The University of Wyoming is An Equal Opportunity, Affirmative Action Employer. Please submit resumes and three letters of reference to:

Sandy H. Adams, Academic Affairs,
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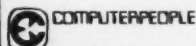
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NEWS

Wang posts loss: cuts salaries, jobs

From page 1

and shipment schedules. While users have generally praised Wang's hardware, they have traditionally given the company low marks for service and support. And the firm's sales force has been criticized for high turnover and inexperience.

"They have not matured as a DP company," said Sam Davis, senior DP staff member of Henley Paper Co., a VS 300 user in Greensboro, N.C. "They tried to go too far into DP before they were ready. For example, we have had five different Wang salesmen in three years, and only the first one had any previous experience with Wang systems. I think Wang will be around for the long-term, but I would doubt whether they will have the DP market share they want."

In addition to its expense reductions, Wang moved last week to shore up its reputation in two areas where it has been considered weak: sales and service. In sales, the company will increase its worldwide sales force by 25%, but some expressed skepticism about that solution. "Adding people doesn't gain them familiarity with the product line," Davis said.

Doretti noted, however, that the Wang sales force will adopt a new approach under Ian Diery, the newly named head of U.S. operations. "Our salesmen will become more of a consultant, business partner type of person," he said. "We realize that hardware has become much more of a commodity."

In service, more responsibility will be shifted to Wang's six U.S. regional offices to be more closely coordinated with the sales force. In addition, the coordination of replacement parts distribution at the firm's Lowell headquarters will be consolidated with the distribution of systems, resulting in the elimination of 200 jobs.

Wang laid off 1,600 employees in June 1985 and reduced its work force by a comparable number in 1986 through attrition and retirements. But a reduced cost structure has not translated to much improvement at the bottom line.

After earning a modest \$50 million in fiscal 1986, Wang lost \$30 million in the quarter ended Sept. 30 and will report a loss of about \$35 million in the most recent quarter, the company said last week. Analysts estimate that Wang will not return to profit-

ability until its fourth fiscal quarter and is likely to report its first-ever annual loss in fiscal 1987.

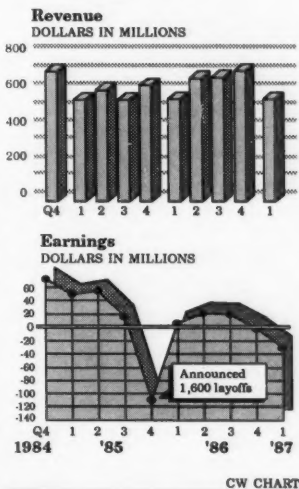
"Fortune 1,000 companies have Wang for word processing, but the MIS attitude is that they will stay off in that corner," said George Colony, president of the Forrester Research, Inc. consulting firm in Cambridge, Mass.

In his less than two months as president, Fred Wang has taken several major actions, including a re-alignment of sales executives as well as last week's work force cuts. Even with cost savings, however, most observers and users say the company faces an uphill struggle.

"Credibility with the MIS director is still tough for anyone who's not IBM; Digital Equipment Corp. is making some inroads, but Wang is not," said Mark Hayward, a Houston-based Coopers & Lybrand office systems consultant who has worked with several large Wang users, including Tencoco Corp.

MITCHELL J. HAYES

Wang financials



"We've had a lot of start-up problems with Wang, but we like most of their products," said Walt Jenison, chief of the information systems branch of the Tennessee Valley Authority, which recently signed a potential five-year contract extension for up to \$57.9 million. "We've got some apprehension as to whether Wang will maintain currency. IBM has a deep pocket, but the question is, How deep is Wang's pocket?"

Wang to unveil VS 150

LOWELL, Mass. — Wang Laboratories, Inc. reportedly is set to announce what shapes up as a replacement for its mid-range VS 100 superminicomputer.

The introduction, scheduled for Wednesday, is expected to center on what has been known during development stages as the VS 150. Wang also is expected to announce enhanced software programs.

However, observers also speculated that Wang plans to introduce a new nomenclature for its higher performance systems by grouping

the VS 150 and VS 300 in the new VS 7000 family. That would help to differentiate the VS 7000 from the older and smaller VS systems, which use different architectures than the VS 150 and VS 300.

The VS 150 is said to provide more power than the 5-year-old VS 100, which observers have rated at 1.1 million instructions per second. One analyst said the VS 150 will be suited for customers who need to support 85 to 100 users but who do not need the power of a VS 300.

—James Connolly

Soothsayers list full menu of IBM PC products in 1987

By David Bright

In terms of personal computer announcements, IBM will be busy in 1987.

Among the computer giant's expected introductions are a low-end replacement for the original PC, a faster PC AT system and a next-generation workstation, all of which could have extra built-in functional capabilities such as graphics and communications capabilities.

"It's been two years since they introduced anything reasonably significant, and I think you're going to see a lot of activity from them" in 1987, says Gibbs Moody, an analyst with Gartner Group, Inc. in Stamford, Conn.

The first item on IBM's agenda appears to be a small, low-end Intel Corp. 8086-based PC, which most observers say will be targeted for the home and educational markets. IBM's severe PC XT price reductions to dealers earlier this month indicate that "the new low-end 8086 machine is certainly coming soon," according to Aaron Goldberg, vice-president of microcomputer services at International Data Corp., a Framingham, Mass.-based market research firm.

The new system will be priced in the \$1,200 to \$1,400 range, Goldberg says. While this price is still considerably higher than many clones, Goldberg says the unit will contain built-in extras such as a color graphics adapter and as much as 1M byte of random-access memory.

IBM is generally expected to announce a 10MHz 80286-based AT system in the first quarter.

Some analysts note that IBM will probably use application-specific integrated circuits to reduce the size and manufacturing costs of the new AT. Clare Fleig of International Technology Group in Los Altos, Calif., says that the system will likely contain fewer add-in slots because more functionality will be built into the motherboard. As a further space savings, the system might also incorporate 3.5-in. floppy disk drives, Fleig says.

Fleig and many observers peg the

price of the new AT at about \$4,000. IBM's XT Model 286 and entry-level AT price reductions of last week — from \$3,995 to \$3,395 — would seem to make room for such a system.

Many IBM watchers are convinced that Big Blue will further respond to corporate America's demand for faster systems by introducing an Intel 80386-based PC system this year. This is a topic of much debate, but Tim Bajarin of Creative Strategies Research International in Santa Clara, Calif., argues that IBM has no choice because of the corporate world's "insatiable appetite" for more speed.

On the other hand, John Rutledge at Dillon Read & Co., New York, maintains that IBM's next-generation workstation, due in the first half of this year, will not use the 80386 as its main processor. Instead, he says, the system will be centered around proprietary hardware and a proprietary operating system with an emphasis on connectivity.

"The whole purpose of the offering will be to enhance the power of the MIS director again," Rutledge says.

Andy Seybold, president of The Seybold Group, Inc. in Torrance, Calif., agrees that IBM will use connectivity in an attempt to set itself apart from the clones and that "the 386 AT is not going to happen" in 1987.

For the long term, many observers say they would not be surprised to see IBM offer a version of its VM operating system for a 32-bit microcomputer system, but Moody and others say that is not likely to happen this year.

It is generally expected that IBM will add some proprietary features to the forthcoming multitasking version of PC-DOS, but Microsoft Corp. has given no timetable for the new DOS.

In line with its connectivity thrust, IBM will move toward putting LU6.2 and Token-Ring interfaces in firmware, observers say.

Seybold expects IBM to improve its Token-Ring network and perhaps bring out a faster network as well.

Esber: IBM OS going proprietary

By Alan Alper

NEW YORK — IBM will embrace a proprietary operating system in its next generation of microcomputers as part of a strategy to strike back at personal computer-clone vendors, according to Edward Esber, chairman and CEO of Aston-Tate.

Speaking to the New York Society of Security Analysts last week, Esber said market-share gains made by PC clones and IBM's collaboration with Intel Corp. on custom circuitry lead him to believe that a proprietary operating system cannot be too far behind.

"I firmly believe IBM will go proprietary," he said. "There will be communications and graphics capability built into the box to take it from a commodity to a higher margin product."

Esber said that while a propri-

etary operating system would have distressed the microcomputer industry a year ago, today there appears to be an impetus for a non-IBM Personal Computer standard. "There is no question IBM has been slow to innovate," he said. "If companies like Tandy Corp. and Compaq Computer Corp. endorse a second standard, I believe there will still be a viable industry not tied to IBM's coattails."

Ultimately, IBM, like Digital Equipment Corp., will have one operating system spanning its micro, mini and mainframe computer lines, according to Esber. "If you ask any MIS manager today, he'd tell you he'd like one operating system for mainframes through micros," he said. But, he added, "If you have one operating system for the PC through the 3090, there would be too many compromises."

COMPUTER INDUSTRY

Cullinet Software buys PCI

Pays \$4.3 million in cash for small company

By Clinton Wilder

WESTWOOD, Mass. — Cullinet Software, Inc. last week acquired Planning Control International, Inc. (PCI), a small developer of project management applications targeted at the government contract manufacturing market.

Cullinet will pay \$4.3 million in cash for the firm.

PCI's main product is Easytrak, a project management package initially developed for the Digital Equipment Corp. VAX computer line. It has recently been ported to IBM mainframes and specially equipped IBM Personal Computer ATs and XT's.

Easytrak is used by about 50 cus-

tomers in manufacturing and government contracting.

Wholly owned subsidiary

Privately held PCI, based in Newport Beach, Calif., employs 40 people and recorded approximately \$4 million in sales in 1986. PCI will operate as a wholly owned Cullinet subsidiary, and PCI President Michael Sipple will report to new Cullinet President George Tamke.

According to Cullinet, PCI's products will complement Cullinet's Contract Tracking and MRPII software for manufacturing planning and control.

PCI's other products are Easybids, a pricing and scheduling application, and Performance Management System. Performance Management System compiles government-required information for Easytrak.

Microrim CEO Johnson quits; Marketing VP Hull takes helm

By Peggy Watt

REDMOND, Wash. — Kent Johnson resigned last week after nearly five years as president and chief executive officer of microcomputer data base developer Microrim, Inc. for other, unspecified business pursuits.

Succeeding Johnson is David F. Hull, Microrim's vice-president of marketing for the past nine months.

Also promoted by the board of the privately held firm was Joseph L. Silva, to executive vice-president and chief operating officer. Silva will retain his post as Microrim's chief financial officer.

Hull said Johnson's departure was a surprise, adding that the departure was amicable and that the former CEO will remain as a part-time consultant to Microrim.

Will explore new ventures

Hull said Microrim will explore several new ventures under his leadership, including the role of software publisher for outside developers and

forays into other applications besides data bases.

"You never know when the next software category is going to be born," said Hull, who mentioned project management and graphics applications among Microrim's potential interests.

He said Microrim will also look upward to larger CPUs for both new programs and connectivity for its existing Rbase product line.

Hull came to Microrim from Ashton-Tate, where he was director of product marketing for data base products.

First micro venture

Microrim was Johnson's first microcomputer venture, and he was its seventh employee, according to company records.

The Seattle native is a Certified Public Accountant and a former manager in the management consulting division of Arthur Andersen & Co.

Microrim founder Wayne J. Erickson remains company chairman.

Prize offered to developer

SAN FRANCISCO — PCW Communications, Inc. has announced the first Andrew Fluegelman Award, a \$5,000 cash prize to be awarded to the developer of innovative and significant personal computer software.

Any micro software product that was developed by an individual or team and that was released between 1983 and 1986 will be considered eligible.

Nominations, which may include utilities, applications, languages or other software packages, may be submitted by anyone who did not participate in the development of the product.

Vendors may nominate products they market but must nominate the

developer or development team, not the company.

Judgment criteria will include advancement of personal computing, concept and design innovation and level of orientation to the user.

Nominations must be postmarked by Feb. 1. The winner will be announced in March.

The award will be given in honor of Fluegelman, the late developer of PC Talk, which was the first powerful, easy-to-use communications program for the IBM Personal Computer.

Nomination forms can be obtained by writing to Andrew Fluegelman Award, PCW Communications, Inc., Suite 600, 501 Second St., San Francisco, Calif. 94107.

Analysts hold moderate expectations for stocks



ACTIVE ISSUES

Kathy Porteus

Because an upturn in domestic demand continues to elude the overall computer industry, analysts hold only moderate expectations for technology stock performances this year.

"If we keep going through this sloppy business environment, investors will be hard-pressed to find winners in the minicomputer sector," says Thomas McCrann of Merrill Lynch & Co.

McCrann says stock selectivity remains the watchword. He suggests that looking for companies with effective cost-reduction programs and, optimally, with development of new product lines. "The key is finding stocks where fundamentals have improved but the stocks have not."

At this time, McCrann says he favors Apollo Computer, Inc. (APCI — 17½%) because its technical workstation business has begun improving and Wang Laboratories, Inc. (WANB — 11½%) because investor expectations are so low that much of the risk has been removed from the stock.

According to Michael R. Weisberg, director of research with Robertson, Colman & Stephens, this year investors should look for opportunities in the markets for technical workstations, vector processing, local-area networking and low-end commercial systems.

Weisberg says he believes stocks of niche utility software and niche semiconductor companies should also perform well. What makes these technology sectors attractive, Weisberg adds, is that their improving fundamentals have set the stage for strong earnings momentum among well-positioned players.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Paul Johnson, semiconductor analyst with L. F. Rothschild, Unterberg Towbin, agrees that smaller, niche-oriented semiconductor companies will "probably get to strut their stuff" this year. Johnson cites Integrated Device Technology, Inc. (IDTI — 10½%) and LSI Logic Corp. (LLSI — 11½%).

Johnson says he expects the semiconductor industry to grow between 5% and 10% this year, barring any big swings in inventory. "This represents a stable growth year in which the best-managed companies will have the chance to excel, whereas those firms with weak management will not have the market to save them."

Another Rothschild analyst, Frederic Cohen, suggests that the strong performance in 1986 among low-end computer and software stocks may begin spreading to the rest of the computer group this year. "It looks as though a recovery cycle in the computer group is underway, and we are playing the low-end companies now because they are the first to show improvement in their business," Cohen says.

"But broad-based investing in technology will still not be attractive," says Fran Saldutti, who recently moved from Gartner Securities to L. F. Rothschild. "Areas that pick up in 1987 will do so because of new product cycles," he adds.

Although investors this year face basically the same issues of stock selectivity that existed throughout 1986, they now also face the effects of a changing business climate in Europe. According to Weisberg of Robertson, Colman, companies serving foreign markets will see that portion of their business worsen as the year progresses.

But the overall earnings performance of computer companies this year will not be materially different from that of 1986, Weisberg estimates.

Nevertheless, the timing of this upturn in domestic demand is uncertain enough to cause some analysts to hold back stock recommendations. As Merrill's McCrann says, "check back with me in three or four months."

Comdisco unit loses \$22M

By Clinton Wilder

ROSEMONT, Ill. — Comdisco, Inc. said last week it will report sharply lower earnings in the quarter ended Dec. 31 because of a substantial loss from its risk arbitrage subsidiary, Comdisco Equities, Inc.

The independent computer-leasing industry leader said it will report a profit of 15 to 20 cents per share for the first quarter of fiscal 1987.

In the year-earlier quarter, Comdisco earned 57 cents per share, or \$23.5 million, on revenue of \$225 million.

Comdisco Equities incurred a \$22 million pretax loss, which constitut-

ed 14% of its invested equity, during the quarter.

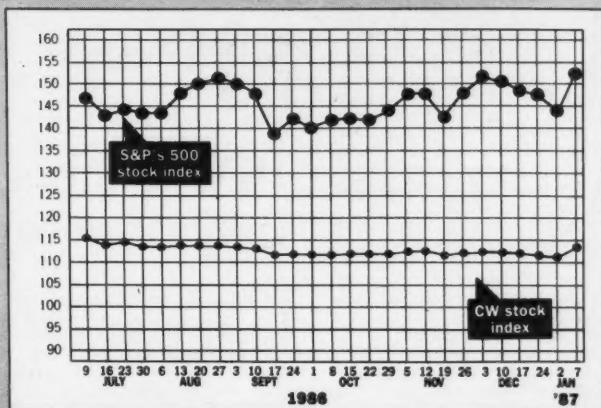
Comdisco Chairman Kenneth Pontikes said the loss was directly attributable to the plunge in risk arbitrage stocks after the Securities and Exchange Commission charged arbitrator Ivan Boesky with illegal insider trading. This charge came on Nov. 14.

Pontikes said Comdisco's core businesses, including computer leasing and remarketing and disaster recovery services, earned approximately \$16 million during the quarter, compared with \$5 million in the year-earlier period.

COMPUTER INDUSTRY

MITCHELL J. HAYES

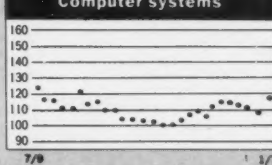
Computerworld stock trading index



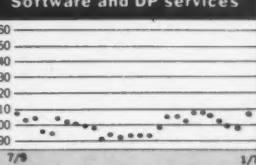
All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	1/2/87	1/7/87
Computer systems	109.7	118.3
Software and DP services	98.9	107.1
Peripherals and subsystems	100.4	108.6
Supplies and accessories	136.6	141.7
Semiconductors	71.4	78.7
Leasing companies	87.2	92.8
CW stock index	111.6	113.0
Standard and Poor's 500 stock index	144.8	152.7

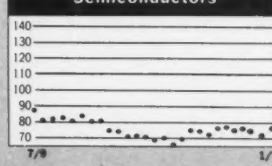
Computer systems



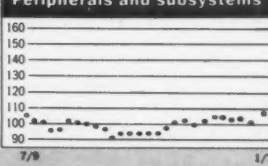
Software and DP services



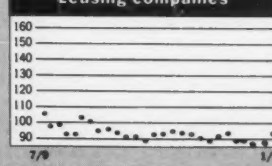
Semiconductors



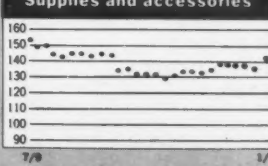
Peripherals and subsystems



Leasing companies



Supplies and accessories



Computerworld stock trading index

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E X C H		PRICE				E X C H		PRICE				E X C H		PRICE						
		52-WEEK RANGE (1)	CLOSE 1987	WEEK NET CHNGE	WEEK PCT CHNGE			52-WEEK RANGE (1)	CLOSE JAN 7 1987	WEEK NET CHNGE	WEEK PCT CHNGE			52-WEEK RANGE (1)	CLOSE 1987	WEEK NET CHNGE	WEEK PCT CHNGE			
COMPUTER SYSTEMS																				
O	ALPHA MICROSYSTEMS	8	4.75	+0.1	+2.7	O	ADVANCED COMP TECH	7	3	4.25	+0.3	+6.3	A	AM INTL INC	9	5	7.38	+1.0	+15.7	
O	NOR CORP	19	10	12.25	+1.0	+8.9	N	ADVANCED SYS INC	19	12	18.00	-0.5	-2.7	A	ANDERSON JACOBSON INC	3	1	1.75	-0.1	-6.7
A	ANDHIL CORP	27	14	26.75	+3.4	+14.4	N	AGS COMPUTERS INC	32	17	31.25	+3.3	+11.5	O	AST RESH INC	32	11	14.13	+1.3	+9.7
O	APOLLO COMPUTER INC	18	9	18.00	+1.9	+11.6	O	AMERICAN MGMT SYS INC	24	11	24.00	+4.8	+24.7	O	AUTOTROL CORP	10	5	6.00	+0.3	+4.3
O	APPLE COMPUTER INC	45	22	44.75	+4.3	+10.5	O	AMERICAN SOFTWARE INC	19	9	18.75	+2.4	+14.5	O	AVANT GARDE COMPUTING	7	3	4.88	+0.9	+21.9
N	AT&T	28	21	25.75	+0.8	+3.0	N	ANACOMP INC	7	3	4.13	+0.4	+10.0	O	BANCTEC INC	13	6	10.63	+1.4	+14.9
O	CPT CORP	7	3	3.50	+0.3	+7.7	O	ANALYSTS INTL CORP	10	4	3.75	-0.3	-7.5	N	BOLT BERANEK & NEWMAN	48	34	45.00	+5.6	+14.3
N	COMPAQ COMPUTER CORP	23	12	22.38	+3.1	+16.2	O	ASHTON TATE	49	18	48.75	+4.3	+9.6	A	CETEC CORP	9	5	5.13	+0.1	+2.5
A	COMPUTER CONSOLES INC	12	6	8.86	+0.6	+7.6	O	ASK COMPUTER SYS INC	15	9	11.88	+1.4	+13.1	N	COGNITRONICS CORP	6	2	3.00	+0.4	+14.3
O	CONCURRENT COMP CORP	25	1	17.50	+1.3	+7.7	O	ASTRADYNE COMP IND	7	4	6.38	+0.1	+10.9	N	COMGRAPHIC INC	28	16	19.63	+0.6	+3.3
N	CONTROL DATA CORP	29	19	26.88	+0.5	+1.9	N	AUTOMATIC DATA PROC	40	28	39.25	+4.0	+11.3	N	COMPTON DIVISION CORP	19	10	14.50	+1.1	+8.4
O	CONVERGENT TECH	14	4	6.63	+0.6	+10.4	O	BOOLE & BARRAGE INC	7	4	6.38	+0.6	+10.9	N	CONRAC CORP	18	12	13.50	+0.8	+5.9
N	CRAY RESH INC	100	57	88.75	+7.9	+9.7	O	COMPUTER ASSOC INTL INC	25	16	16.25	+0.0	+0.0	O	DATAPRODUCTS CORP	18	11	12.25	+0.8	+6.5
O	DANISH SYS CORP	28	8	9.50	+1.1	+13.4	O	COMPUTER HORIZONS CORP	14	10	11.25	+0.8	+7.1	A	DATAARM CORP	18	7	7.13	+0.5	+7.5
N	DATA GEN CORP	49	25	34.13	+4.5	+15.2	O	COMPUTER NETWORK TECH	12	4	4.31	+0.1	+3.0	O	DATA SWITCH CORP	9	5	6.13	+0.8	+14.0
N	DATAPoint CORP	9	5	6.13	-0.3	-3.9	N	COMPUTER SCIENCES CORP	46	30	45.00	+2.8	+6.5	O	DATUM INC	7	4	4.75	+0.5	+11.8
N	DIGITAL EQUIP CORP	112	65	111.38	+6.6	+6.3	O	COMPUTER TASK GROUP INC	19	11	12.25	+0.4	+3.2	N	DECISION INDUS CORP	15	8	9.63	+0.9	+10.0
N	FLOATING POINT SYS INC	46	11	11.63	+0.4	+3.3	O	COMPTON SYS INC	32	4	3.19	+0.0	+0.0	O	ENRATA INC	8	4	7.00	+0.3	+3.7
N	GOLD INC	32	15	17.75	+1.5	+9.2	O	COMSHARE INC	16	10	12.88	+0.4	+3.0	O	EMC CORP	22	11	21.00	+0.3	+1.7
N	HARRIS CORP	37	26	32.25	+2.5	+8.4	N	CULLINET SOFTWARE INC	19	6	6.75	-0.1	-1.8	O	EVANS & SUTHERLAND	29	18	27.75	+2.5	+9.9
N	HEWLETT PACKARD CO	30	36	44.25	+2.4	+5.7	O	CYCARRE SYS INC	17	7	8.88	+1.5	+20.3	N	FLOATING POINT SYS INC	46	11	11.63	+0.4	+3.3
N	HONEYWELL INC	84	58	80.25	+1.1	+1.9	O	DUQUESNE SYS INC	33	14	35.50	+3.8	+11.8	O	GANDALF TECHNOLOGIES	8	5	7.63	+0.5	+7.0
N	IBM	162	119	123.50	+3.5	+2.9	N	GENERAL ELEC CO	91	67	91.00	+5.0	+5.8	N	GENERAL DATACOMM INC	15	8	8.50	+0.5	+6.3
N	IBM SYS INC	4	1	2.38	+0.3	+11.8	N	GENERAL MTRS CORP	50	24	24.13	-0.8	-3.0	N	HAZELTONE CORP	30	16	29.75	+0.0	+0.0
N	ITT CORP	60	35	56.63	+3.3	+6.1	O	HOGAN SYS INC	12	7	11.88	+1.3	+11.8	O	ICOT CORP	13	8	9.38	+1.1	+13.6
N	IM A COM INC	19	12	13.13	+0.5	+4.0	O	INFORMATION SCIENCES INC	4	1	0.94	+0.2	+25.1	O	INFORMATION INTL INC	18	13	13.88	+0.6	+4.7
N	MATSUMITA ELEC INDU LTD	136	60	126.75	+0.0	+0.0	O	INFOTRON SYS CORP	19	7	8.00	+0.3	+3.2	O	INTECOM INC	7	3	3.00	+0.0	+0.0
O	MENTOR GRAPHICS CORP	20	11	18.63	+3.4	+22.1	O	KEANE INC	16	5	6.25	+0.6	+11.1	O	INTERLEAF INC	15	8	12.13	+1.4	+12.8
N	NBS INC	14	8	9.38	+0.5	+5.6	N	LOGICON INC	41	22	28.00	+3.9	+16.1	O	MEGADATA CORP	5	2	2.75	-0.1	-4.3
N	NOR CORP	26	17	26.00	+5.4	+12.2	O	LOTUS DEV CORP	58	20	83.25	+1.5	+2.9	A	MIS DATA CORP	14	10	11.63	+0.5	+4.5
N	PRIME COMPUTER INC	28	16	18.38	+2.0	+12.1	O	MANAGEMENT SCI AMER	16	11	13.75	+1.0	+7.8	N	NASHUA CORP	28	15	22.38	-1.0	-4.3
O	STRATUS COMPUTER	26	17	26.00	+4.9	+23.1	O	MCI COMM CORP	13	6	5.83	+0.4	+6.0	O	NETWORK SYS CORP	17	10	15.63	+1.8	+12.6
O	SYMBOLICS INC	15	4	4.75	+0.4	+8.6	O	MCNE INC	23	10	14.75	+1.3	+9.3	N	NORTH AMERICAN PHILIPS LTD	38	25	43.63	+2.3	+5.4
O	TANDEM COMPUTERS INC	40	20	37.75	+3.5	+10.2	O	MICRO PRO INTL CORP	4	2	2.69	+0.1	+4.9	O	NOVELL INC	29	14	26.75	+3.0	+11.7
N	TECHNICAL DATA CORP	148	103	120.00	+5.6	+13.2	O	MICROSOFT CORP	26	15	22.75	+1.5	+7.1	O	PARADYNE CORP	11	4	5.00	+0.0	+0.0
A	ULTIMATE CORP	35	13	23.00	+1.4	+6.4	O	NATIONAL DATA CORP	17	10	16.00	+1.8	+12.3	A	PENRIL INC	9	4	4.38	+0.8	+20.7
N	UNISYS	67	58	66.63	+6.6	+8.3	O	ORACLE SYS CORP	29	13	22.00	+1.3	+6.0	N	PLESSEY PLC	38	22	27.88	+0.9	+3.2
A	WANG LABS INC - B	22	11	11.50	-0.1	-1.1	N	PANORPAC SYS INC	38	24	26.00	+0.1	+0.5	O	PRINTRONIX INC	15	10	10.25	+0.3	+2.5
A	WANG LABS INC - C	22	11	11.38	-0.1	-1.1	O	POLICY MGMT SYS CORP	25	15	25.00	+2.0	+8.7	O	QMS INC	16	9	9.38	+0.5	+5.6
N	XEROX CORP	72	49	63.00	+3.0	+5.0	O	PROGRAMMING & SYS INC	11	8	8.88	+0.6	+7.0	O	RAMTEK CORP	7	3	5.63	+0.3	+4.7
SUPPLIES & ACCESSORIES																				
N	AMER BUSINESS PRODS	37	23	27.38	+1.6	+6.3	O	REYNOLDS & REYNOLDS CO	42	25	33.75	+0.8	+2.3	O	RECOGNITION EQUIP INC	7	3	19.00	+3.5	+22.6
N	BARRY WRIGHT CORP	25	14	16.13	+1.0	+6.6	O	SCIENTIFIC COMPUTERS INC	6	4	5.81	+1.4	+31.0	O	SCAN TRON CORP	19	11	15.75	+2.1	+15.6
N	DUPLEX PRODS INC	23	18	18.50	+0.6	+3.5	O	SHARED MED SYS CORP	28	15	19.75	+1.3	+6.8	N	SCIENTIFIC ATLANTA INC	15	9	11.63	+0.5	+4.5
N	ENVIS BUSINESS FORMS INC	28	21	28.63	+2.1	+8.0	O	SOFTWARE AG SYSTEMS INC	22	10	12.75	+1.0	+8.5	O	SEAGATE TECHNOLOGY	22	7	22.00	+2.9	+15.0
N	3M CO	121	86	120.38	+3.8	+3.2	O	STERLING SOFTWARE INC	5	5	8.13	+1.1	+18.1	N	STORAGE TECHNOLOGY	7	2	3.88	+0.4	+10.7
N	MOORE LTD	28	19	21.38	+0.8	+3.6	N	SUNGUARD DATA SYSTEMS	16	10	14.75	+1.3	+9.3	O	SUN MICROSYSTEMS INC	26	11	25.13	+2.1	+8.9
O	STANDARD REGISTER CO	50	32	36.25	+0.1	+0.3	N	TELECOM CORP	27	15	26.75	+2.1	+8.6	A	TAB PRODS CO	15	11	14.13	+0.8	+5.6
N	WALLACE COMPUTER SVCS	50	37	42.75	-0.8	-1.7	N	URS CORP	18	11	17.13	+1.6	+10.5	O	TANDON CORP	8	2	2.50	+0.2	+8.1
SEMICONDUCTORS																				
N	ADVANCED MICRO DEV	34	13	14.50	+0.8	+5.5	O	REYNOLDS & REYNOLDS CO	42	25	33.75	+0.8	+2.3	A	TEC INC	7	3	3.50	+0.1	+3.7
N	ANALOG DEVICES INC	25	14	17.25	+1.6	+10.4	O	SEI CORP	28	15	19.75	+1.3	+6.8	N	TEKTRONIX INC	74	55	73.25	+5.3	+7.7
N	ANALOGIC CORP	15	10	11.00	+0.3	+2.3	O	SHARED MED SYS CORP	22	10	12.75	+1.0	+8.5	O	TELEVIEW SYS INC	4	2	2.25	+0.3	+12.5
N	APPLIED MAGNETICS CORP	20	13	17.00	+1.1	+7.0	O	SOFTWARE AG SYSTEMS INC	22	10	12.75	+1.0	+8.5	O	TELEX CORP	75	52	73.88	+6.9	+9.3
O	AVANTEC INC	23	14	16.63	+1.4	+9.0	O	STERLING SOFTWARE INC	5	5	8.13	+1.1	+18.1	O	TELEVISION INC	27	14	26.75	+3.4	+14.4
O	HADCORP	6	3	3.13	+0.3	+8.7	N	SUNGUARD DATA SYSTEMS	16	10	14.75	+1.3	+9.3	O	TIMEPLEX INC	27	14	26.75	+3.4	+14.4
O	INTEL CORP	163	123	23.25	+2.3	+7.7	N	TELECOM CORP	27	15	26.75	+2.1	+8.6	O	TRON CORP	12	1	0.00	+0.0	+0.0
O	MICRO MASK INC	7	2	4.25	+1.1	+36.0	N	URS CORP	18	11	17.13	+1.6	+10.5	O	VISUAL TECHNOLOGY INC	1	0	0.44	+0.0	+0.0
O	MOTOROLA CORP	50	34	45.50	+1.3	+5.3	O	VM SOFTWARE INC	24	12	23.75	+3.8	+18.8	O	WYSE TECH	20	11	19.88	+2.6	+15.2
N	NATIONAL SEMICONDUCTOR	16	8	11.63	+1.0	+9.4														
N	TERAYDINE INC	30	16	16.63	+0.3	+1.5														
PERIPHERALS & SUBSYSTEMS																				
A	AM INTL INC	9	5	7.38	+1.0	+15.7	A	AM INTL INC	9	5	7.38	+1.0	+15.7	N	COMDISCO INC	25	12	17.13	+1.4	+8.7
A	ANDERSON JACOBSON INC	3	1	1.75	-0.1	-6.7	N	ANDERSON JACOBSON INC	3	1	1.75	-0.1	-6.7	N	CONFIDENTIAL INFO SYS	12	6	9.63	+1.1	+13.2
O	AST RESH INC	32	11	14.13	+1.3	+9.7	N	AST RESH INC	32	11	14.13	+1.3	+9.7	N	FINANCIAL SERVICES INC	5	3	3.94	+0.0	+0.0
O	AUTOTROL CORP	10	5	6.00	+0.3	+4.3	O	AUTOTROL CORP	10	5	6.00	+0.3	+4.3	O	PHOENIX AMERIN INC	6	3	5.00	-0.3	-18.5
O	AVANT GARDE COMPUTING	7	3	4.88	+0.9	+21.9	O	AVANT GARDE COMPUTING	7	3	4.88	+0.9	+21.9	O	SELECTRAM INC	12	8	5.00	-0.3	-4.8
O	BANCTEC INC	13	6	10.63	+1.4	+14.9	O	BANCTEC INC	13	6	10.63	+1.4	+14.9	N	US LEASING	38	24	44.25	+1.5	+3.4
N	BOLT BERANEK & NEWMAN	48	34	45.00	+5.6	+14.3	N	BOLT BERANEK & NEWMAN	48	34	45.00	+5.6	+14.3	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
A	CETEC CORP	9	5	5.13	+0.1	+2.5	A	CETEC CORP	9	5	5.13	+0.1	+2.5	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
N	COGNITRONICS CORP	6	2	3.00	+0.4	+14.3	N	COGNITRONICS CORP	6	2	3.00	+0.4	+14.3	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
N	COMGRAPHIC INC	28	16	19.63	+0.6	+3.3	N	COMGRAPHIC INC	28	16	19.63	+0.6	+3.3	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
N	COMPTON DIVISION CORP	19	10	14.50	+1.1	+8.4	N	COMPTON DIVISION CORP	19	10	14.50	+1.1	+8.4	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
N	CONRAC CORP	18	12	13.50	+0.8	+5.9	N	CONRAC CORP	18	12	13.50	+0.8	+5.9	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
O	DATAPRODUCTS CORP	18	11	12.25	+0.8	+6.5	O	DATAPRODUCTS CORP	18	11	12.25	+0.8	+6.5	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7
A	DATAARM CORP	18	7	7.13	+0.5	+7.5	A	DATAARM CORP	18	7	7.13	+0.5	+7.5	N	UNIVERSITY MICROFILMS	12	6	11.63	+1.4	+8.7

COMPUTER INDUSTRY

INSIDE

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INSTANT ANALYSIS

"It wasn't until mid-1985 that we began to understand what the business market really wants and needs and what we as a company really have to offer."

— John Sculley, chairman, president and CEO of Apple Computer, Inc., in Apple's 1986 annual report

Ashton-Tate sues Migent

Says Dbase II author, other former workers lifted secrets

By Douglas Barney

TORRANCE, Calif. — Stung by the defection of numerous key employees in the past year to Migent Software, Inc., Ashton-Tate last week filed suit against Incline Village, Nev.-based Migent, charging misappropriation of trade secrets, unfair competition and breach of contract.

Migent currently markets Ability, an integrated package that competes in the same market as Ashton-Tate's Framework, and Enrich, a data base that competes with Ashton-Tate's Dbase III. Migent Chairman Carl Gritzmaker is a former Ashton-Tate executive, and some 15 to 20 other Migent employees, formerly worked for Ashton-Tate.

Observers said they believe a Migent

project code-named Emerald Bay is the key reason Ashton-Tate filed suit. Emerald Bay is currently under development by C. Wayne Ratliff, author of the original Dbase II. Migent claims Emerald Bay will employ a data base engine with interfaces and applications surrounding it.

Ashton-Tate has publicly stated its interest in the data base engine concept, referring to the approach as unbundling Dbase or "hitting Dbase with a hammer." A source close to Migent indicated that Ashton-Tate hopes to prove that the data base engine concept is proprietary.

Ratliff, who left Ashton-Tate in early 1986 to found Ratliff Software Productions, Inc. in Los Angeles, holds the honorary title of chief scientist for Migent.

According to Ashton-Tate, Migent and codefendant Queue Associates, Inc. illegally transferred Ashton-Tate's software technology. "Given the overwhelming evi-

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IBM to close analytical tools unit

By Clinton Wilder

ARMONK, N.Y. — In its first cost-cutting move of the year, IBM announced last week that the firm will exit the U.S. analytical instruments business in the next six months.

IBM will shut down its Danbury, Conn.-based IBM Instruments, Inc. subsidiary and offer its 150 employees other positions within IBM. A spokeswoman for the company refused to disclose the unit's annual revenue.

IBM, which will announce its second straight annual earnings decline next week, has been pursuing an unprecedented corporate austerity program for the past year.

Actions by the computer industry giant in 1986 included early retirement incentives, a virtual hiring freeze, curtailment of travel and meeting expenses and the closing of a parts distribution center in

Greencastle, Ind.

A corporate statement said IBM formed the instruments subsidiary in 1980 to help its computer business gain a foothold in sales to analytical laboratories in government, industry and education.

Will remain in market

The company said it will continue to participate in the market without selling analytical instruments.

Brüker Instruments in Billerica, Mass., will continue to market and distribute IBM instruments in the U.S. IBM divested its partial ownership of Brüker and one other company that manufactured IBM instruments under IBM contracts.

IBM said it will accept no more orders for instruments after April 13. However, its national service division will continue to service the subsidiary's products for five years.



INDUSTRY INSIGHT
Donald F. Blumberg

IBM's shifting service strategy

IBM has always been a major force in the computer equipment service market. In fact, IBM has always used service strategically as a factor in supporting and influencing its product sales and in controlling its market share and product position. However, significant changes have been taking place with respect to IBM's future growth and existing business strategy.

IBM's combination of deteriorating revenue and profit performance and the emergence of major third-party maintenance competition have created a new service strategy within IBM.

This strategy is broadly focused on delivering service to customer sectors as a separate line of business. A new Customer Service Sector marketing team has been established to provide total service and support to the customer base with focus in vertical market segments, such as finance and brokerage, banking and manufacturing.

The strategy is to deliver total integrated and managed service and support to the installed base of equipment on the customer's premise, focusing specifically on network services and support.

In essence, the new IBM service strategy visualizes total support of the customer's installed base of equipment in general and network structures in

See IBM's page 103

Blumberg is president of D. F. Blumberg & Associates, a consulting firm in Fort Washington, Pa.

Unisys one of three shareholders withdrawing from MCC research

By James A. Martin

AUSTIN, Texas — Unisys Corp. was one of three shareholders at Microelectronics and Computer Technology Corp. (MCC) to announce recently that it will pull out of the consortium's research programs at the end of 1987.

Sperry Corp., which merged with Burroughs Corp. and became Unisys, was involved in all four MCC research and development projects. But Unisys management decided to drop out of MCC and redirect R&D efforts elsewhere, according to Unisys spokesman J. Peter Hynes. He would not elaborate.

According to an MCC requirement, members interested in dissolving their shares must notify the consortium one year in advance. As a result of this requirement, Unisys will continue as an MCC shareholder until Dec. 31 of this year or until it sells its

share to another company.

In addition to Unisys, both Allied-Signal, Inc. and Lockheed Space and Missile Co., a subsidiary of Lockheed Corp., announced they will withdraw from MCC at year's end. Allied-Signal is departing because it is selling its Amphenol Products division, which was involved in MCC research projects.

Lockheed said that it wants to concentrate on developing products that are not related to any MCC research projects.

A company can withdraw with less than one year's notice if it locates a buyer for its share, according to William Stotesbery, MCC spokesman. Each member owns one share of MCC. At present, there are 20 shareholder companies. That figure will drop to 17 by year's end if the shares of the three departing companies are

See UNISYS page 102

Olivetti licenses Orion facility

Implementation to begin with PC 6300

By Elisabeth Horwitz

BERKELEY, Calif. — In a development that will allow the AT&T Personal Computer 6300 to exchange documents using IBM protocols, Ing. C. Olivetti & Co. has agreed to license The Orion Group, Inc.'s Document Interchange Architecture (DIA) facility for implementation on Olivetti computer systems.

DIA specifies protocols for packaging a document that can then be exchanged with systems that support DIA protocols. These include IBM System/36 and 38, IBM's Distributed Office Support Systems (Disoss) and a growing number of non-IBM computers. Olivetti and Orion are expected to jointly announce their agreement today.

While the license permits Olivetti

to implement Orion's DIA software on any of its systems, the company will initially target the PC 6300, which Olivetti manufactures for AT&T, and minicomputers distributed in Europe.

While the Microsoft Corp. MS-DOS-based PC 6300 can use IBM 3270 terminal emulation boards to access IBM hosts, the DIA software provides direct document exchange between AT&T's micro and IBM systems using the DIA format, according to Orion Group President Paul Rampel.

Support of DIA will also enable Olivetti computers to exchange documents with non-IBM systems that support DIA and to access library and distribution services on IBM's Disoss protocols.

At the present time, Olivetti has announced no plans to license other IBM-based communications software offered by Orion, in particular the

See OLIVETTI page 100

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CIRCLE READER SERVICE NUMBER 205

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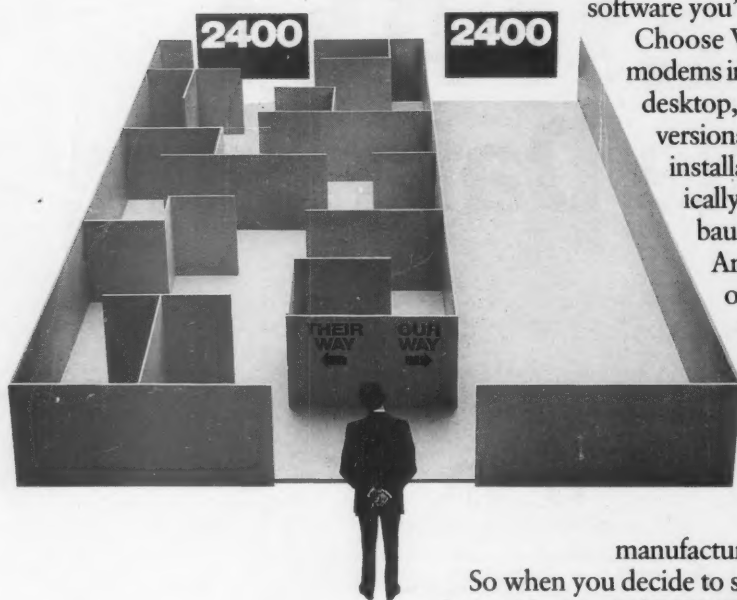
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